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Martin Scullion and David Nicholas

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Wired in Whitehall: a survey of Internet and intranet use in government
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The impact of the Web on the stockbroking industry: Big Bang 2

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An investigation of what effect online trading is having on the traditional stockbrokerage industry. There have been lots of discussions and articles written over the last couple of years debating whether the traditional stockbrokerage model is about to be upstaged by the new online version touted by the online brokerage industry. With so many diverse views being portrayed it is difficult to fully gauge the real impact that online trading is having on the traditional stock brokerage industry. A large-scale questionnaire and interview study was conducted to get some answers.

Introduction

The Internet Studies Research Group has been researching the impact of the Internet on some strategic areas of industry and government. In particular the Group has been concerned with the position of traditional practices and how they fare in the new Internet environment. This article reports on a piece of research that was undertaken to discover what impact online trading was having on the traditional stockbrokerage industry. The aim of the project was to develop an in-depth understanding of the issues facing the stockbroking industry with the objective of being able to answer the question 'What effect is online trading having on the traditional stockbroking industry?'

More specifically we wished to discover:

- The number of online investors?
- Where they come from?
- Whether online investing appealed to an older and more risk adverse type of investor?
- What were the perceived advantages of online brokerages?
- Whether transaction costs were heading for zero?
- What were the implications for acquiring new clients?
- What effect would a protracted bear market have on the online brokerage industry?
- More about the alleged online brokerages' poor service record
- Whether after hours trading provides the online industry with an important competitive advantage?
- Whether online brokers can compete if competitive advantage changes from cost to content?
- What is the future of the stockbrokerage industry?
- What is the state of the UK online brokerage industry?

Background

The stockbroking industry is in a state of flux, if not panic. Not only is the industry witnessing the introduction of new trading facilities and the move towards the demutualisation of some of the world's major stock exchanges, but it is also witnessing the rapid emergence of an online industry. Although the stockbroking industry has faced serious challenges in the past the emergence of an online industry surely poses the greatest threat. The online industry has massive cost advantages over the traditional brokerage. Although traditional brokerages have had to face up to the threat from discount brokers, they have not been exposed to a competitor who potentially could destroy the traditional model. The threat posed by online brokerages does not solely come from their cheaper transactions, although for a lot of investors this is by far the most important incentive for initially becoming involved in online trading. Convenience and freedom also add to the allure

The degree to which traditional brokerages will be affected by online trading depends on how successful the online industry is at capturing more of the retail market. If the online industry continues to increase its share of the retail market, then smaller traditional brokerages that derive most of their revenues from share transactions are going to be badly affected Also execution only services are highly influenced by the cost of a trade. The larger traditional brokerages derive considerably less revenue through share transactions so they are not so vulnerable to the affects of online trading. If the online industry is unable to increase the 38% share of the retail market that it has so far captured, then the overall affect on the traditional industry will probably be limited to some of the smaller traditional brokerages having to merge with financially stronger brokerages.

If on the other hand the online industry not only continues to increase its share of the retail market and starts to provide other services that were once the exclusive domain of traditional brokerages, and can capture similar market share, then the affects would be felt across the entire industry. If the online industry is able to successfully move up the value chain to offer more than just cheap trades the traditional industry could find itself in a battle for survival. The online industry is far better positioned than the traditional brokerages to operate in an environment of low margins

Possibly the main factor driving online trading has been the unprecedented bull market that began in the mid-nineties. A large number of investors have earned huge returns on their investments. In fact some analysts would argue that exchanges like Nasdaq, for example, has lead to a casino mentality when it comes to buying stocks. Now that market conditions are not so favourable, and a lot of investors are now witnessing their first big percentage falls in stock prices, it is possible that the online industry will experience sharp declines from income from share transactions. Any decline in the volume of share transactions would be a major blow to the online industry. Unlike the traditional industry whose revenues from share transactions make up less than 30% of total income, the online industry is dependent on share transactions for up to 70% of total revenues. The online model's dependency on transaction volumes is a major source of weakness. Many online brokerages have exacerbated the dangers posed by being so dependent on one source of income by actively targeting those investors who trade frequently. Although from a business perspective it makes perfect sense to target your services at hyper active investors, who on average generate $75,000 a year in share transaction commissions compared to $400 for the average investor, it still does not address the problem of over dependency from one source of income

After initially choosing to ignore the online trading phenomenon, traditional brokerages are now fighting back and most of the big Wall Street brokerages are now offering their own online trading facilities. Most of these accounts are really wrap accounts that impose a 1% to 2% fee based on the assets in the account, but provide access to all the facilities that the brokerages possess. The traditional brokerages' strategy for providing their customers with online trading facilities seems to be based more on stopping customers migrating to online brokerages than any serious attempt to attract new investors.

Whether online brokerages are able to successfully add the services that will be required before they achieve wide scale acceptance amongst mainstream investors remains to be seen. It is perfectly feasible that traditional brokerages will be able to successfully incorporate the opportunities provided by the Internet to enhance their own business model, and reap the advantages of both models. Traditional brokerages have a lot of advantages over their online rivals with their huge product range, and in-house expertise that no online brokerages can currently match. Unlike the online industry, which is still losing money, the traditional industry is highly profitable. Some traditional brokerages are quick to point out that their established infrastructure provides them with a massive advantage over the online industry, which in general provides little more than a cheap execution service.

Interestingly, some analysts draw attention to the fact that the traditional industry's established infrastructure may be its biggest liability. Instead of being able to modularise its services to fit customers' needs, traditional brokerages seem to work on the principle of full service or no service Only time will tell whether the traditional model continues to reign undisputed, or whether the new online model will completely reshape the entire stockbrokerage industry.

Methodology

Structured interviews and an online questionnaire were the methods used to investigate the topic.

Interviews

Structured interviews were conducted between 9th February and 10th March 2000. The task of identifying suitable candidates was conducted by means of cold calling stockbrokerages listed on the London Stock Exchange. The website of the New York Stock Exchange was also visited to obtain the names of US brokerages. All of the major Wall Street brokerages were contacted via email together with a random sample of 50 other US based stockbrokerages. In total 100 traditional and online stockbrokerages were identified with the objective of interviewing key personnel. A total of 19 professionals were in fact interviewed. The interviews assisted in the piloting of the questionnaire

Questionnaires

The first stage of the questionnaire survey involved identifying a website that would host it. The location for the questionnaire was important. The site chosen needed to be high profile, and involved in the financial service sector. Also the questionnaire itself needed to be located on the website where it would attract the most attention. It was obvious from the beginning that it was going to be difficult to motivate investors to take the time to participate in the online questionnaire. BTA Consulting was the company that agreed to host the questionnaire.

Once the website had been identified the next stage involved publicising the questionnaire. Two strategies were employed for this purpose. The first one involved emailing 30 online publications and other websites that were geared towards investors. Of the 30 emails that were sent only 10% of companies responded. Eventually an administrator from a company that manages 10 websites agreed to host the questionnaire on their sites, and more importantly recommend it to their subscribers. The second approach involved using online bulletin boards to place messages that publicised the questionnaire. This proved to be an extremely time consuming exercise, and initially there was very little interest in the survey from the investing public. After three weeks of the questionnaire being online less than 50 investors had taken the time to fill it in. At this point it was decided to greatly expand the number of bulletin boards with messages publicising the questionnaire.

The online questionnaire was in operation from 10th April through to 19th May 2000 and was completed by 276 investors who utilised online brokerage facilities. Of the 276 responses, 256 were used in this research project.

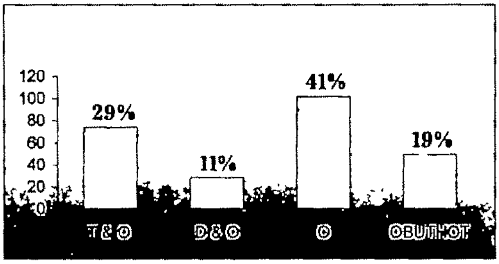
Results

Origins of the online investor

Cerulli consultants report that the main growth area for online brokers over the next few years will be the 15 million customers that currently use discount brokerage services Additionally, Cerulli concluded that at the end of 1998 investors migrating from discount to online accounts made up more than half of the total number of online investors. Dow Jones found that 70% of investors who were not currently investing online were unlikely to do so in the future. If these conclusions are correct, the online industry's ability to challenge the dominance of the traditional stockbrokers and fundamentally alter the direction of the stockbrokerage industry is going to be limited

Interestingly, the results from our survey paint a much more favourable picture of the potential growth patterns of the online brokerage industry. Figure 1 portrays the investor make-up of the participants who filled in the online questionnaire The questionnaire confirms that a majority of online investors (41%) were in fact new investors. This supports the view that new investors have played a very important part in the initial success of the online industry The results also confirm that the online industry has been successful at poaching clients from both the traditional and discount brokerage industry. In fact, rather than finding themselves limited to fighting for customers within the discount arena, online brokerages have had more success at attracting clients from the traditional industry. These figures are consistent with other published surveys, which have calculated that approximately 30% to 35% of traditional broker clients also have online accounts.

Figure 1. *Online investor makeup*



T & O = investors who have both a traditional and online account
D & O = investors who have both a discount and online account.
O = investors who only have an online account
OBUTHOT = online investors but used to have other types of accounts

Surprisingly online brokerages have not been as successful at acquiring discount brokerage customers. Only 11% of discount customers also had an online account. It was not possible to obtain an exact breakdown on the percentages of former discount and traditional brokerages' customers who had given up their accounts in favour of exclusively using an online account

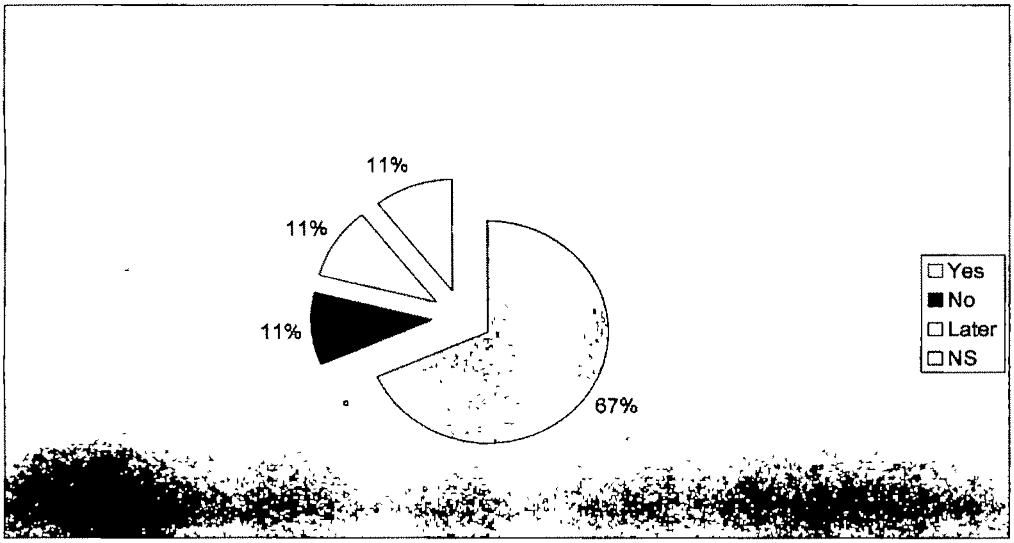
Appeal to the older, more risk adverse type of investor

The established view of the market indicates that online trading would not appeal to 70% of investors who are not already investing online. Interestingly 67% of respondents disagreed with the statement and said that online trading would appeal to an older and more risk adverse type of investor (Figure 2). Reasons cited included:

- Technology is becoming less of an age barrier. Investors are becoming more familiar with and comfortable using the Internet and therefore the fear of investing online diminishes
- Governments are encouraging citizens, older investors in particular, to prepare for their retirement through tax concessions and other incentive programmes. Encouraging people to begin investing their retirement funds privately may avoid the Government's projected retirement fund deficit
- Older investors have the added advantage of having the time to research attractive stock portfolios.
- As the availability of research material increases, courtesy of the Internet, investors will be tempted to explore online trading as a way to save commission fees on share transactions. Online brokerages recognise that they need to widen their potential client base and this means adding new services and facilities that will appeal to the next generation of investors.

Of the respondents 67% stated that online investing would appeal to an older and more risk type of investor, 11% said that online trading would not be appealing and 11% felt that online trading would become an attractive option at a later stage when the technology had improved. Several analysts pointed out that online brokers will have to set up call centres to allow investors access to brokerage services that do not involve going through the Internet. One participant suggested that when web technology is TV enabled, online trading would be just another channel like the BBC1, BBC2, and web shopping They also added that when online trading becomes truly interactive individuals will be able to ask their financial advisors questions, simulated discussions or real discussions can take place, investors can play back a tape of an infomercial – then online trading has the potential to appeal to anyone.

Figure 2 *The appeal of online trading*



Yes = the number of respondents from the interviews who thought that online trading will appeal to an older and more risk averse type of investor
No = the number of people who disagreed
Later = the number of people who thought it would appeal, but at a later stage
NS = no response

Number of online investors

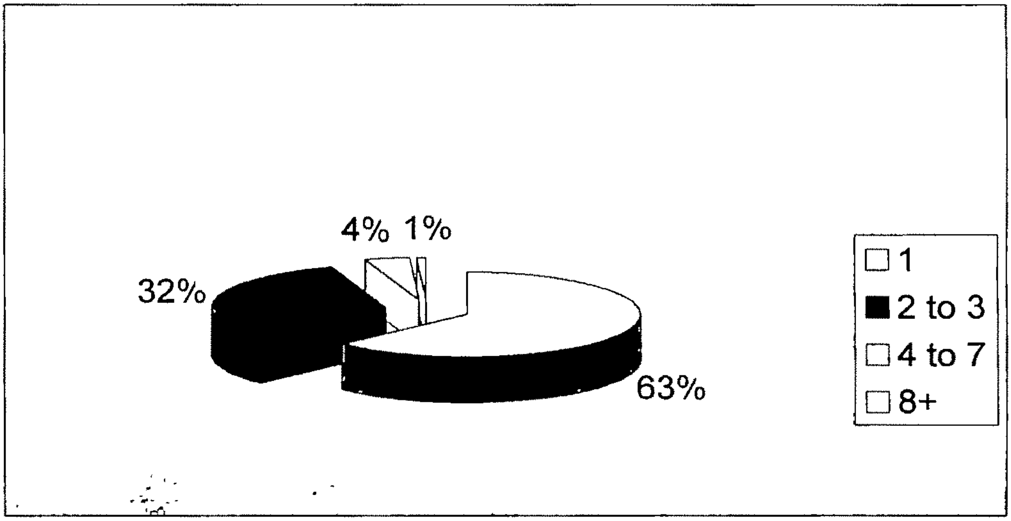
A hotly debated issue concerns the number of online investors and what actually constitutes an active account? Many commentators question the measures employed by the online industry in calculating the number of accounts owned by online investors. According to US Bancorp PiperJaffray, there is no industry standard as to what constitutes an active account. Furthermore, the online industry may be inflating their numbers by counting investors who have opened accounts but are not trading.

The online brokerage industry's ability to attract new accounts has been phenomenal In the first quarter of 2000, over three million new accounts have been added. This brings the total number of online accounts to 15 million and assets within these accounts have surpassed the $1 trillion mark. The volume of online trades on the NYSE and Nasdaq has increased 23% since the last quarter of 1999 to 38% of all transactions executed.

However, the problem with counting online accounts is that it is estimated that 37% of investors have numerous accounts with different online brokerages. Forrester Research estimates that there will be seven million online accounts in 2000. Their estimates for the number of online accounts are based on active accounts rather than the number of online accounts. A visit to any of the major online bulletin boards shows that a lot of investors frequently change brokerages, or have numerous accounts that are affectively inactive.

According to our findings (Figure 3) a majority of investors only have one account. However, 37% of respondents had online accounts with multiple online brokerages. This would indicate that a lot of online accounts could not be considered active in any true sense of the meaning. Therefore the quoted figure of 15 million online accounts, although technically correct, is somewhat misleading because many of these accounts are inactive.

Figure 3 *Online investors with multiple accounts*



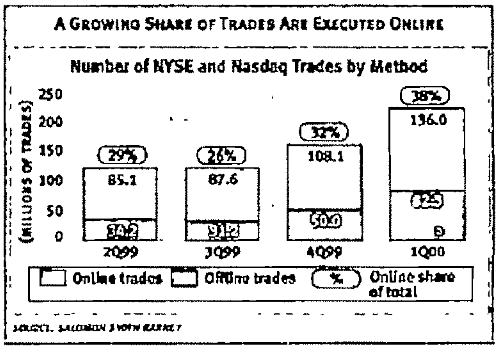
1 = investors who only have one online account at one online brokerage

The benefits of online brokerages

The online brokerage industry has been very quick to forecast the demise of the traditional stockbrokerage industry; they talk about a paradigm shift in the way investors invest. The number of US households who own an online account is projected to reach 20 million by the year 2003 [1] Many insiders now believe that online trading will fundamentally alter the face of investing. A majority of participants who took part in the interviews also agreed with these sentiments.

Although it is true that online brokerages have made some very impressive gains in terms of market share (Figure 4) the battle between the competing sectors for supremacy has not run its full course The results of our survey highlight some unexpected advantages for the online industry and would suggest that some of the commonly held conceptions about the advantages the traditional stockbrokerage industry possesses do not bear up under scrutiny (Figure 5). However, we also identified a number of weaknesses in the arguments that online brokerages have employed to justify a paradigm shift in the way that investors invest (Figures 6 and 7).

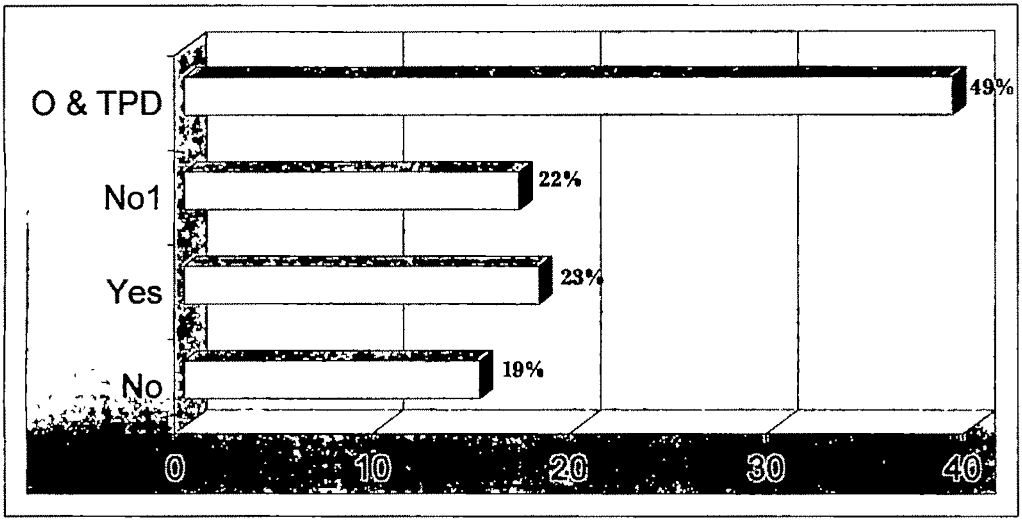
Figure 4 *Share of trades conducted online*



Source Smith Barney as shown in *http // www TheStanard com* Battle of the brokers May 15 2000

Two of our findings that may cause the traditional brokerage industry to reassess their own online strategies is the number of investors who have both an online and traditional account and are considering abandoning their traditional brokerage in favour of their online brokerage (Figure 5) Interestingly cost was not the only reason cited by investors who were considering giving up their traditional

Figure 5. *Transaction costs are not investors only concerns*



O & TPD = traditional clicents with online accounts who would not give up their traditional accounts because of costs.
No 1 = traditional clients with online accounts who would not give up their traditional accounts because of costs and answered yes to costs being the most important issue for opening up an online account.
Yes = traditional clients with online accounts who would consider giving up their traditional account because of the cheaper costs of trading online, and also answered yes to costs being the most important issue for opening up an online account
No = traditional clients with online accounts who would consider giving up their traditional account because of the cheaper costs of trading online, and also answered no to costs being the most important issue for opening up an onlne account

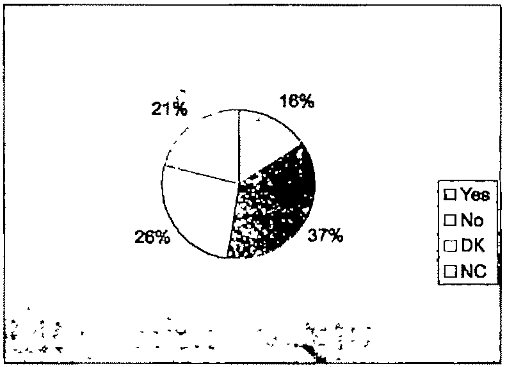
accounts to trade solely online Other reasons cited by investors included·

- The ability to make their own investing decisions without feeling the need to justify it to brokers.
- Online brokers are better for trading if you know what you are doing.
- The poor level of service was not worth the extra costs of using a traditional brokerage.
- The ability to make trades instantaneously
- The poor quality of research material provided by some traditional brokerages
- Possible conflicts of interest over certain trading recommendations.
- Research material was now freely available to allow them to make their own decisions.
- The recreational aspects of direct trading.

Nineteen per cent of respondents said they would consider giving up their traditional brokerage in favour of the cheaper transaction costs of online brokerages; but also answered no to costs being the most important issue when opening up their online accounts. Twenty-three per cent of respondents, who said that they were considering giving up their traditional accounts in favour of the cheaper transaction cost of online brokerages, also answered that cost was the most important issue when opening up their online account.

One of the more confusing survey findings concerns the contradictory results from questions that deal with cost related issues. The published literature appears to be evenly split between analysts who either thought that cost differentiation would provide the online industry with the winning strategy, or that service, not cost, was the winning combination. Probably the most important cost related question centres around whether the

Figure 6 *Will the majority of investors abandon traditional brokerages because of cost differentiation?*



Yes = interviewees who agreed that a majority of investors would be lured away from traditional brokerages because of costs differentiation
No = interviewees who did not agree that a majority of investors would be lured away from traditional brokerages because of costs differentiation
DK = interviewees who did not know whether a majority of investors would be lured away from traditional brokerages because of costs differentiation
NC = interviewees who had no comment

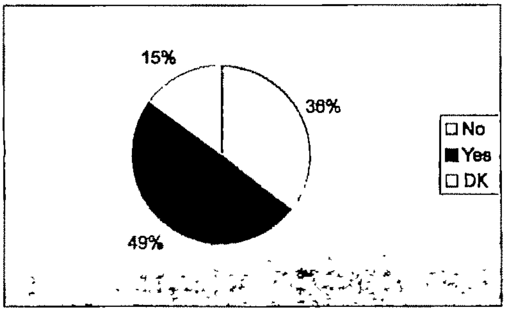
majority of traditional investors will be lured away from the traditional brokerages because of cost differentiation?

Interestingly 37% of interviewees (Figure 6) thought that the majority of investors would not be lured away from traditional brokerages because of cost differentiation. Some brokers and analysts felt that cost was not the issue and that you get what you pay for; they also commented that traditional brokers hold their clients' hands, and that investors have someone to blame when things go wrong because this is very important to a lot of investors. Other brokers thought that content was more important, and that the Internet could provide traditional brokerages with another avenue for disseminating their research material to investors who were willing to pay for the information. Another interviewee commented that brokers thrive from bundling advice and other products to investors who do not want to do it themselves. Still another analyst commented that costs are only going to be an issue for the next two to three years and will not be a factor after that because it is all going to end in zero fees, and at that point service and brand will be the differentiating factors.

Other brokers and analysts had just the opposite opinion. 'I think there will be virtually no trading done at full service brokerages in the traditional commission method within the next 5 years to 10 years.' Another broker noted that if investors were looking for execution only they would be lured away because cost is the key driver. Traditional brokers will have to reinvent themselves said another broker. A lot of these business models are going to have to change to high volume low margin said another analyst Mark McCain, an analyst at Forrester Research, said that there are three types of investors: delegators, validators (who participate in the management of their financial decisions) and soloists. In 1999 51% of the population were delegators, 35% were validators, and 14% were soloists These figures are forecast to change by 2001 to 46% for delegators, 41% for validators and 13% for soloists, which should ultimately benefit the online industry at the expense of the traditional brokerages.

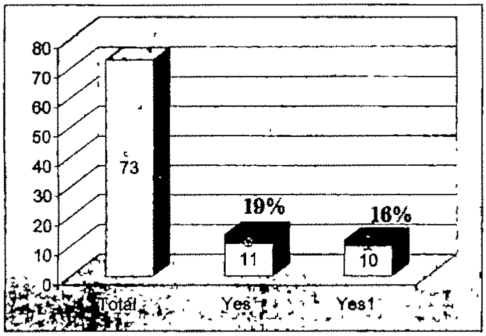
The results from the questionnaire differ from the results obtained from the interviews, but agree with the published literature. Although just over 40% of investors (Figure 1) who had an online account said that they were considering giving up their online

Figure 7 *Do traditional brokerages provide a better service than their online counterparts?*



DK = don't know
Based on 71 respondents with both a traditional and online account.

Figure 8 *It takes more than superior service*



Yes = the 11 investors who answered yes to considering giving up their traditional accounts because of the cheaper transaction fees charged by online brokerages, and answered yes to the cost of transactions as being the most important issue when opening up an online account, and agreed that traditional brokerages provided a better service than their online counterparts Three investors agreed with the above except that they felt traditional brokerages do not provide a better service than their online counterparts

Yes 1 – the 10 investors who answered yes to considering giving up their traditional accounts because of the cheaper transaction fees charged by online brokerages, and answered no to the cost of transactions as being the most important issue when opening up an online account, and agreed that traditional brokerages provided a better service than their online counterparts Two investors agreed with above except that they felt traditional brokerages do not provide a better service than their online counterparts

account because of cheaper transaction costs, only 16% of interviewees agreed with this statement. In other words about two and a half times the number of online investors who also have a traditional account were considering deserting the traditional brokerages because of cost differentiation. Interestingly approximately 60% of investors with online accounts also said that they would not give up their traditional brokerage account because of costs. However, almost a third of this total was made up of investors who had said that cost was the most important issue when opening up their online account.

The other conclusion that can be drawn from the results of the questionnaire, which in many ways is even more disturbing for the traditional stockbrokerage industry, concerns the common assumption that traditional brokerages provide better services and that is ultimately what investors want and will pay for. Figure 7 refers to investors who own a traditional and online account, who were asked whether they thought traditional brokerages provided a better service than their online counterparts. The most surprising findings are that although an overall majority of respondents agreed that traditional brokerages provided a better service, a majority (60%) of the investors who actually had a traditional account did not agree, or were not sure.

Even more surprising was that 35% of investors, who had both a traditional and an online account, said that they were considering giving up their traditional account because of the cheaper transaction fees charged by online brokerages (Figure 8). These same investors also said that traditional brokerages provided a better service than their online counterparts.

Implications of acquiring new clients

The acquisition cost of attracting new customers has reached a point of unsustainability. Online brokerages are currently engaging in a ferocious battle to attract new clients. One broker commented that 'everyone wants to get their foot in the door and feels that they have to spend big bucks to do so'. Another broker remarked that 'it's going to lead to economical rationalisation; it's not going to go on forever'. There is a point where people are going to have to be rational about customer acquisition.

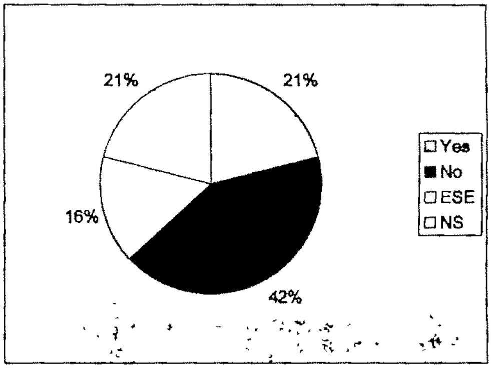
The dilemma facing the online industry is that, as we have seen, a lot of investors have multiple accounts that are inactive. Dan Burke of Gomez Advisors said, 'the issue becomes what can the firm do to make sure that not only are they not spending too much, but they are getting the right people, it's a double edge sword'. Another analyst said that online brokerages are going to have to pull back. They need to revaluate so that they can start generating profits. Dan Burke estimates that it costs $100 per year in technology related expenses per customer. A cheaper solution for acquiring new customers might involve financially stronger online brokerages buying smaller less successful players. Unfortunately, it costs approximately between four to five thousand dollars to acquire an account, although costs are on a downward trend.

Effect of a protracted bear market on the online industry

A few commentators have argued [2, 3] that the impact from a protracted bear market is likely to prove especially painful to the online industry because they are potentially more vulnerable to the effects than the traditional brokerage industry. Traditional brokerages have multiple revenue streams, unlike most online brokerages, and are also not as dependent on income from share transactions. Also the online industry is very susceptible to any declines in revenues from margin lending because for a lot of online brokerages this has now become a very big source of income. In fact, online brokerages have issued $40 billion in margin debt, which is 20% of the total of all margin debt lending in the US; this corresponds to 6% of all their clients' shares The online industry, while acknowledging that transaction volumes would fall in a bear market, believe that investors will be tempted to give up their traditional accounts for the cheaper transaction fees of online brokerages.

The results from our survey tend to support the view of the online brokers. However, the traditional brokers who participated in the survey tended to take the same stance as the traditional brokers portrayed in the literature, but not exclusively so. Sixteen per cent (Figure 9) of participants thought that the pain would be evenly spread between traditional and online brokerages, while 42% felt that a protracted bear market would not cause investors to flee online brokerages. One traditional broker made the comment that, 'I don't think those customers [online investors] will exist in a protracted bear market. They just won't have any money to invest because most people will not sell shares at a loss.' It would not be a case of online investors deserting the online brokerages. It will be that they do not have anything to trade. Volumes die because people will not take losses.

Figure 9 *Would customers desert online brokers in a protracted bear market?*



Yes = interviewees who thought that investors would flee the online brokerages in a protracted bear market
No = interviewees who thought that investors would not flee the online brokerages in a protracted bear market
ESE = effects spread evenly between traditional and online brokerages
NS = not sure

Surprisingly, 68% of investors (see Figure 10) who participated in the questionnaire said that a bear market would not effect, or it would only marginally effect, their investing patterns. Investors tended to be a lot more optimistic than the professionals who took part in the interviews are Interestingly new online trading figures that have just been released for the month of May show a 35% drop in the volume of trades conducted online. Although trading volumes normally dip in the summer months, historically investors do not trade much in a falling market The 35% decline in trading volume closely corresponds to the 32% of investors who said on the questionnaire that they either sit on the sidelines or trade up to 75% less in a bear market

Interestingly the type of account that an investor owned did not influence the answers that they gave concerning their investing patterns in a bear market It had been assumed that because online investors tended to be aggressive and more risk tolerant that their investing patterns might not be affected much by a bear market. In fact, the percentage of investors who answered each of the four categories of questions concerning investing intentions (Figure 11) in a bear market were almost

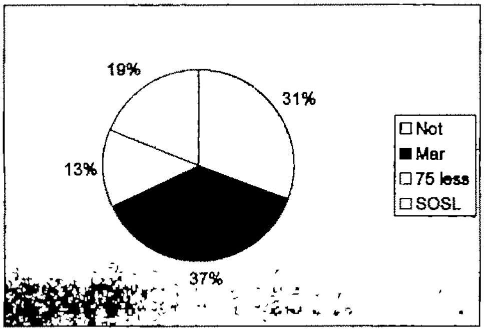


Figure 10 *Investors responses to a bear market*

Not = Investors who said a bear market would not affect their investing patterns
Mar = investors who said a bear market would only marginally affect their investing patterns
75 less = Investors who said a bear market would cause them to trade up to 75% less
SOSL = investors who said it would cause them to stay on the sidelines until the market stabilised

identical. The data collected from the questionnaire appears to concur with the theory from the three interviewees who said that the pain of a bear market will be evenly spread between all sectors of the investing community.

The competitive advantage of after hours trading

One of the claims made by the online brokerage industry concerns the competitive advantage that could be gained from providing after hours trading. Although in theory after hours trading through ECN's are available to both traditional as well as online brokerages, in reality the online industry is probably better placed to integrate after hours trading because it would cause a lot less disruption to their current working practises.

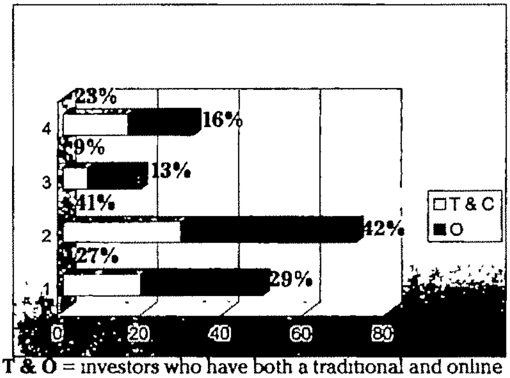
Interestingly the result from the interviews supports these claims, but the result from the questionnaire does not. Fifty-two per cent of interviewees (Figure 12) thought that after hours trading was going to provide the online industry with an advantage over the traditional industry, because the online industry is better placed to take advantage of after hours trading. One consultant commented that 'the world works on a 24-hour basis, and that once after hours trading becomes a market available service brokerages who do not offer it will be out'. Another broker said that, 'it's going to be a lot more economical than a traditional brokerage where they are going to have to have endless amounts of traditional guys coming in at weird hours. It's very difficult to get people to work those weird hours'

However, other brokers thought that after hours trading would not have wide-scale appeal until there was sufficient liquidity in the market One broker commented that what was needed was a third party to step in who could access all the ECN's and provide price discovery, which is the key.

Surprisingly 59% of investors (Figure 13) answered no to the question 'Is the ability to trade after hours important to you?' It is possible that the discrepancy between the interview and questionnaire data is due to the current lack of liquidity, and thus the volatility that can be witnessed in the after hours market.

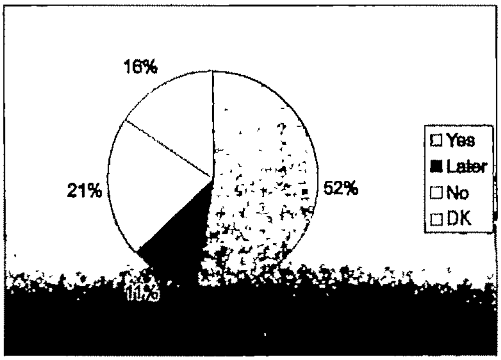
An interesting pattern emerged from the data to do with investors' attitudes to after hours trading. Investors who only had online accounts, or investors who used to have other types of

Figure 11 *Investors investing intentions in a bear market*



T & O = investors who have both a traditional and online account
O = investors who only have an online account
1 = investors whose current investing patterns would not be affected by a bear market.
2 = investors whose current investing patterns would only be marginally affected by a bear market.
3 = investors who would trade up to 75% less than they do now.
4 = investors who would sit on the sidelines until the market stabilised

Figure 12 *Will after hours trading provide online brokerages with an advantage?*

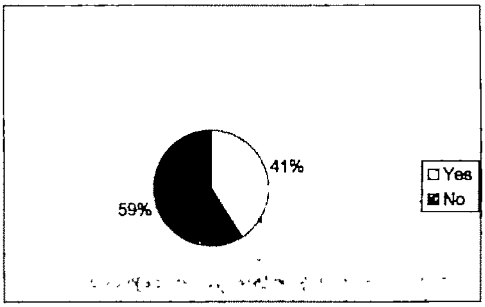


Yes = interviewees who thought that after hours trading would provide online brokerages with an advantage
Later = interviewees who thought that after hours trading would provide online brokerages with an advantage, but at a later stage when there is more liquidity in after hours trading
No = investors who don't think that after hours trading would provide online brokerages with an advantages
DK = interviewees who don't know

accounts but now only have online accounts, are more interested in trading stock after hours than investors who also have a traditional or discount account. Considering that investors who only have an online account, or have an online account plus a discount account, make up 60% of the online investing customer base (Figure 2), this could have important consequences for the online industry.

The breakdown of responses is as follows: 46% of investors who only have an online account (Figure 14) said that trading after hours was important to them, whereas only 35% of investors who have both a traditional and online account made the same statement. Of investors who used to have other types of accounts, but now only have an online account, 44% also said that after hours trading was important to them. Finally, 26% of investors who had an online account and a discount account said that after hours trading was important to them.

Figure 13 *Is the ability to trade after hours important to you?*

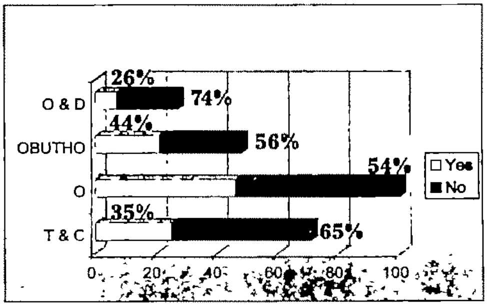


The shift from price to content

Numerous articles from the literature review argued that the online battle is shifting away from price to content, and when it comes to content traditional brokerages win hands down. Some articles have then made the assumption that if content is going to be the deciding factor it is logical to presume that traditional brokerages would have a massive advantage over the online industry.

However, some of the conclusions that can be drawn from the interviews would suggest that this might not be the case. In fact the traditional brokerage model may be ill suited for the Internet. The Internet allows online brokerages to easily modularise their products, and use push technology to automatically notify customers with the latest information. This approach is a lot more convenient and cost effective than having a daily telephone

Figure 14 *Is the ability to trade after hours important to you?*



O & D = investors who have both a discount and online account
OBUTHO = investors who have an online account but used to have other types of accounts
O = investors who only have an online account
T & O = investors who have both a traditional and an online account

conversation with your traditional broker. Online brokerages also provide immediacy – something the traditional brokerages do not. Traditional brokerages also do not modularise their products; their approach tends to be full service or no service. Although the focus may shift from one of cost to content, price is still going to be a consideration. Online brokerages are likely to find it a lot easier to tailor their products and services to meet the needs of their customers by modularisation of their services and products, than traditional brokerages are able to do.

The Internet also allows online brokerages to pursue differentiation strategies through innovative services and content The mere presence of a website turns the smallest brokerage into a multinational organisation that can easily be accessed from any location in the world, which to a certain degree will help online brokerages compete against the large traditional brokerages. As one broker wryly pointed out, the online industry is much better placed to trade up than the traditional brokerages are to trade down. The traditional brokerages have been enjoying very large margins, whereas online brokerages are used to dealing with very low margins.

The traditional industry's halfway approach

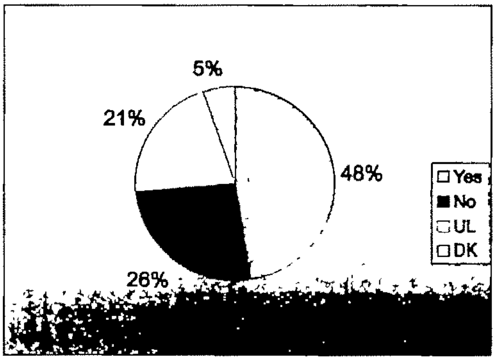
The traditional industry's halfway approach refers to their decision to offer online trading facilities, but not embrace any other parts of the online model. There are basically two views on what will happen to the traditional industry. Firstly, the new online brokerage model is going to fundamentally alter the stockbrokerage business and that traditional brokerages will have to migrate to the Internet or they risk becoming extinct. Secondly, the Internet far from being the destroyer of the traditional business model will actually lead to new opportunities and allow savvy brokerages to collect even more clients and assets.

Interestingly, out of all the questions posed to the interviewees, the only question that caused any real ambiguity concerned the question relating to whether the traditional brokerages' halfway approach to online trading will work. Perhaps surprisingly, even the online brokers who took part in the interviews seemed unsure of the answer. In fact even in the trade literature the argument that the online industry is going to slay the traditional brokerage model is not so popular anymore. Possibly even more worrying for the online industry is the number of articles challenging the theory that the online industry will replace the traditional brokerage industry. Thus Forrester Research suggested that the traditional industry may win the cyberspace war, and that the only thing holding them back was the higher prices that they charge.

Some of the traditional brokerages that have embraced online trading are now reaping the rewards. Prudential Securities has acquired almost $5 billion worth of clients assets in their Advisor account, which is essentially a modified wrap account with online facilities. Clients can get advice from a financial advisor and access to online reports from Prudential's in-house research team. Fees for this account are asset based and start at 1.5%. On top of this fee investors also have to pay $25 per trade, including the ones they do themselves online Interestingly, roughly 30% of clients who have opened an Advisor account did not previously have an account with Prudential.

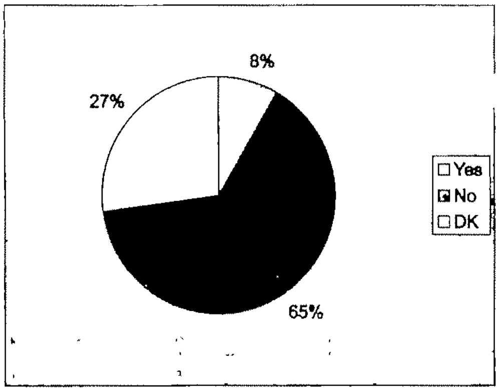
The results from the interviews were unfortunately unable to dispel the ambiguity

Figure 15. *Will the traditional brokerages' halfway approach work?*



U L = interviewees who thought that it was highly unlikely to work
DK = interviewees who were not sure either way

Figure 16. *Would you be willing to pay more for additional services?*



Yes = investors from the questionnaire who said that they would be willing to move to another brokerage and pay more for research and other types of complementary services
No = investors from the questionnaire who said that they would not be willing to move to another brokerage and pay more for research and other types of complementary services.
DK = investors who do not know if they would be willing to move to another brokerage and pay more for research and other types of complementary services

surrounding the question of whether the traditional brokerages' halfway approach to online investing is going to work Although 48% of respondents (see Figure 15) thought that it would work, another 47% thought that it either would not work, or was unlikely to work.

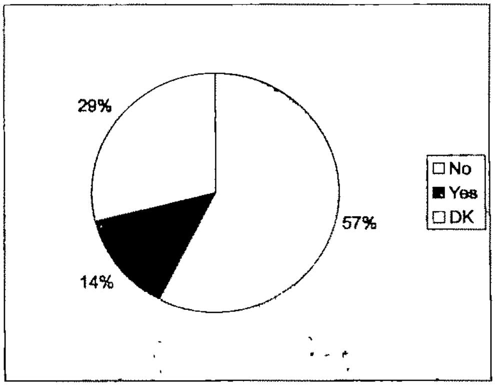
However, probably the most important findings can be drawn from the questionnaire. Ultimately it is the investors who are going to dictate which model is going to triumph. The results from the questionnaire (see Figure 16) suggest that investors are more price sensitive than what the traditional brokerages have anticipated One of the questions on the questionnaire asked investors whether they would be willing to switch from a brokerage that charged $10 a trade to one that charged $30 a trade, but provided they obtained good research and other complementary services. Only 8% of investors would be willing to pay higher fees by switching to another brokerage even if they received good research material and other complimentary services. The next highest group, 27% of investors, was not sure if they would be willing to switch. The overwhelming majority of investors would not be willing to pay higher fees.

Even amongst investors who owned both a traditional and online account (see Figure 17) the number of investors who would be willing to move to another brokerage service and pay more for extra research and other complementary services was only 14%. Whilst 29% answered that they did not know, and 57% said that they would not pay higher fees. Investors who own both a traditional and online account, and who answered yes to the cost of carrying out a trade as the most important issue when opening up an online account, were even more price sensitive (Figure 18). Of investors who fall into this category 71% would not be willing to pay more for extra services, 29% did not know, and no investors were willing to pay more.

Investors who said that the cost of carrying out a trade was not the most important issue when opening up their online account were more willing to pay extra for additional services. However, even in this group, investors who would be willing to pay more still only constituted 26% of investors; 46% of investors would not pay more, and 28% of investors did not know whether they would be willing to pay more

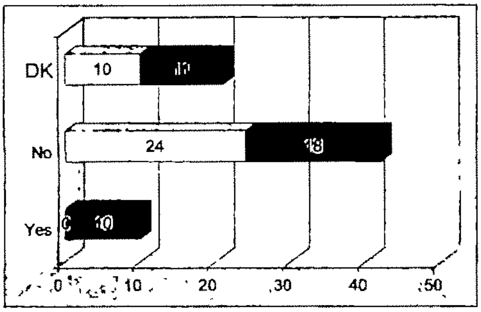
Investors who only had an online account were also very price sensitive (see Figure 19), which was not unexpected. Whilst 70% of

Figure 17. *Investors with a traditional and online accounts who would pay more for extra services*



DK = investors who did not know whether they would be willing to pay more for extra service.

Figure 18 *T & O investors who would be willing to pay more for services*



DK = investors who did not know if they would be willing to pay more for extra research and other complementary services 10 investors who answered yes to the cost of carrying out a trade as the most important issue when opening up their online accounts 11 investors answered no to the cost of carrying out a trade as the most important issue when opening up their online accounts
No = investors who would not pay more for research and other complementary services 24 investors answered yes to the cost of carrying out a trade as the most important issue when opening up their online account 18 investors answered no to the cost of carrying out a trade as the most important issue when opening up their online accounts.
Yes = investors who would pay more for research and other complementary services Only investors who answered no to the cost of carrying out a trade as the most important issue when opening up their online accounts said yes to this question

investors would not be willing to pay more, 25% were not sure, and only 5% would be willing to pay more.

There were three main hypotheses that the interviewees used to justify their particular stances. The argument that was used to justify why the traditional brokerages' halfway strategy would work centred around three assumptions:

- A lot of traditional brokerages' clients are high-end customers and need the advice of a broker These same customers are now able to trade online through their traditional brokerages, and are not too concerned by the high minimum fees that traditional brokerages charge for these types of accounts.
- Traditional brokerage clients who may have abandoned the traditional broker to trade online can now do so. This should stem the flow of customers who have deserted the traditional brokerages because there was no facility to trade online. It also might attract some new investors who are willing to pay for access to the extra services that traditional brokerages provide, but are not willing to pay the high transaction fees that traditional trades incur.
- There is a certain reality that people do not change financial institutions, even when it makes sense to do so.

The reasons cited by interviewees who thought that the traditional brokerages' halfway approach probably would not work included:

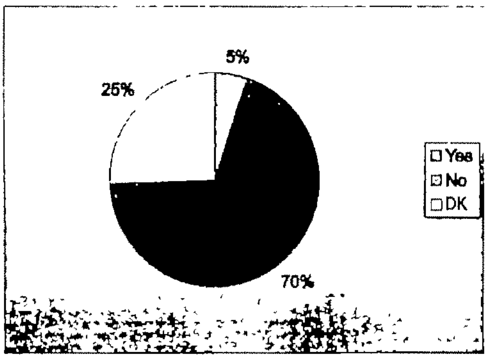
- It will not be the most compelling model for bringing in new clients.
- It is going to be very difficult to reposition the traditional model downwards to compensate for the lower commission rates.
- Younger investors who start out investing online are likely to stick with online investing rather than suddenly opening up a traditional account

The future of the stockbrokerage industry

The material from the literature review and all the interviews did agree that the Internet would change the face of the traditional stockbrokerage industry within the next five years. However, the range of views and opinions regarding these changes and what affect this would ultimately have on the stockbrokerage industry covered a wide spectrum of possibilities.

Not surprisingly the traditional brokers tended to take the view that the Internet will provide traditional brokerages with the ability of attracting new customers, and offering new services. The literature review highlighted the fact that the traditional stockbrokerage industry is currently enjoying the most profitable period in its entire history. Some of them did concede that online brokerages would be successful at stealing some of the traditional brokerage clients However, almost all the traditional brokerages took the position that service is what investors want, and that is what investors will pay for. They did acknowledge that there were a small percentage of investors

Figure 19 *Investors who only have an online account and would be willing to pay more for services*



DK = investors who did not know whether they would be willing to pay more for research and other types of complementary services

who were very price sensitive and probably would be attracted by the cheaper transaction costs of the online brokerages However, overall the traditional brokerages who were interviewed were very optimistic about the future of the traditional stockbrokerage industry, and did not agree with the online industry's assertions that online trading is going to lead to the demise of the traditional brokerage model

Naturally the online brokers, plus most of the assortment of professionals, who were interviewed had a somewhat different perspective on the future direction of the stockbrokerage industry. Online brokers were very quick to point out the impressive numbers of new accounts that the industry had acquired over the last couple of years. Indeed the material from the literature review states that the online industry now boasts over 15 million accounts, and that the industry is booming.

Most of the online brokers were incredibly optimistic about the future and really did believe that there had been a paradigm shift in the way investors invest Interestingly the consultants and other professionals who were interviewed tended to have a more tempered view of the online industry. Although most agreed that online trading would fundamentally alter the stockbrokerage industry, they tended to have a multi-dimensional perspective concerning the potential effects Because there are various scenarios that would have the potential to radically alter the outcome of the traditional model verses the online model argument over the next couple of years. Some of the interviewees concluded that the current battle for investors based on price differentiation is only going to be an issue for the next three years, and after that it will all be based on services and product range.

Although the interviewees did not agree on what brokerage model would be adopted for the future, everyone did agree that the future for the stockbrokerage industry looked bright. The material from the literature review, and the results from the interviews, pointed to the trend of ever increasing investor participation, which is primarily due to the demographics in North America and Western Europe. Also the average citizen is now wealthier than in the past and the stock market is no longer perceived as the domain for the richer sections of the population.

Interviewees also thought that new avenues would open up for investors to interact with their brokerages. Several brokers and consultants commented that web enabled TV could potentially provide a big boost in terms of making investing seem more accessible to the average citizen. Other interviewees also mentioned that the availability of WAP enabled mobile phones could also broaden the appeal of investing, because brokerages would be able to introduce new services that were not currently available or feasible

Conclusions

The online brokerage industry has been phenomenally successful at acquiring new clients and customer assets over the last four years. The number of online accounts in 1996 numbered in the tens of thousands; that figure has sky rocketed to just over 15 million accounts. The online brokerage industry's exponential growth in acquiring new accounts and customer assets has lead many people to believe that the traditional stockbrokerage industry will soon become obsolescent.

The traditional brokerage industry was very sceptical as to the widespread appeal of online trading beyond a very small Internet knowledgeable segment of the investing population, and initially seemed content to ignore the whole online trading frenzy. As the number of online accounts hit a million most of the traditional sector realised that they had to act fast, or risk seeing a large percentage of their customer base migrate to the online brokerages. Most of the large traditional brokerages offer some type of online trading facility.

Instead of fully adapting to the online model traditional brokerages have taken a halfway approach. Traditional brokerages are not attempting to compete with their online counterparts based on price, but rather they are using their perceived superiority in customer services, and the breadth of their product range to differentiate themselves from their cheaper rivals. Most traditional brokerages still view the Internet as another distribution channel instead of something that potentially could fundamentally reshape the entire broker client relationship.

The traditional industry's response towards online trading appears to be a reactive one rather than a strategic one, and this is really the crux of the whole online verses traditional debate Traditional brokerages and online brokerages are at the opposite ends of the spectrum when it comes to viewing the challenges and opportunities posed by the Internet. Whilst the online industry sees the Internet as the great enabler that allows investors to take control of their own destiny, traditional brokerages are still working on the basis that almost all investors want someone to hold their hands and look after their financial well-being.

Traditional brokerages are currently making record profits, and are attracting new funds at unprecedented levels so it is no surprise that they have been so sceptical about the claims of their imminent demise. Indeed, with most major exchanges experiencing huge percentage losses since the carnage began on the Nasdaq in April 2000, and with the daily share volumes that the online industry is so dependent upon having fallen 35%, the traditional industry could be forgiven for gleefully thinking that they, not the online brokerages, are the chosen ones.

The survey data has produced some interesting results, which dispel some of the common assumptions surrounding the traditional and online industries. Although the predictions concerning the eminent demise of the traditional brokerage industry are plainly overblown, the traditional industry is far more vulnerable to the effects of online trading than it acknowledges. This is especially true in the longer term once the online brokerage industry matures, and starts to provide the services that the next generation of online investors will demand before they can be persuaded to give up their traditional accounts. Providing the online industry is able to successfully make the transition from catering for a highly motivated independent customer base, to one that requires a more personalised environment, it is difficult to see why the majority of investors would not be tempted to migrate from the traditional industry.

One of the initial reasons for the traditional industry's lack of concern was that, despite the online industry's success at attracting new accounts, traditional brokerages were not experiencing large numbers of client defections, which is probably why they surmised that online trading would not appeal to full service investors. Certainly there are a lot of investors who would not consider abandoning traditional brokerages because of cost differentiation. There are always going to be investors who need, or want, the kind of support that only traditional brokerages can provide. Forty-nine per cent of the questionnaire respondents who had both a traditional and online account said that they would not abandon their traditional brokerage because of the cheaper costs of trading online. Although traditional brokers may be quick to point out that some traditional customers are only taking the advice of their brokers and placing a few trades online using an online brokerage, the fact remains that traditional brokerages have lost clients to online brokerages.

One of the most hotly debated issues concerns the origins of the online brokerages' clientele. The results from the questionnaire show that the majority of online investors are in fact new investors. However, rather worryingly for the traditional industry, investors who own both an online and traditional account make up the next largest group at 29%. Nineteen per cent of online investors used to have other types of accounts but now only have an online account. Most of this group used to be discount customers. These figures point to the fact that online brokerages have started to make inroads into the customer base of the traditional brokerages.

The questionnaire data suggests that traditional brokerages potentially could see up to 42% of their clients who also own an online account defect to the online industry. Although the majority of traditional clients who are considering giving up their traditional accounts are price sensitive, 19% said that there were reasons other than cost.

Although some of the traditional brokerages do offer online trading accounts that only impose commissions on a per trade basis, these fees are more than double what most purely online brokerages charge In all fairness to traditional brokerages some of these accounts do allow access to a broker, research material and a chance to obtain shares in IPO's at no additional fee, which is something that online brokerages are unable to offer. However, if investors want to trade online and want the same level of services that they normally get from their traditional brokerage, they will have to open a wrap account. The cheapest wrap account that offers unlimited trading currently imposes a 1% annual fee on the first $1 million with a minimum fee of $1500 per year.

No doubt a lot of traditional investors might be persuaded not to abandon their traditional accounts now that traditional brokerages are embracing online investing. Judging from the pricing strategy, it would appear that traditional brokerages were almost exclusively directing their online services at their own customer base in order to avoid any customer migration to the online industry. Whether the traditional brokerages' online strategy is going to work remains to be seen.

There are a number of reasons to suggest that the traditional industry's halfway approach is not going to work in the long term. The Internet is the perfect medium to allow modularisation of products and services. More and more investors are becoming involved in their own financial decision making rather than leaving it all to a broker. Therefore the ability to allow investors to choose and pay for the service that they actually want should provide online brokers with an important advantage. The traditional industry is ill equipped to compete on costs with online brokerages. The traditional model is built upon high margins. The online industry is better placed to trade up than the traditional brokerages are to trade down. Investors are more price sensitive than the traditional industry acknowledges.

The allure of investing online is going to appeal to a much wider audience once online brokerages add more services and increase their product range to meet the second wave of online investors' expectations. In fact 67% of interviewees thought that online trading would appeal to an older more risk adverse type of investor, while 11% said it would appeal at a later date. Traditional brokerages are limiting their appeal to today's young investors with their current pricing structure. Many of today's young investors are opening up accounts with online brokerages, and are unlikely to suddenly decide to give that up and pay a lot more for a full service account.

The final reason to think that the traditional industry's halfway approach is probably not going to work centres around the common assumption that ultimately investors want a certain level of service, and are willing to pay extra for it Since the general consensus is that traditional brokerages provide a much better service than their online counterparts, it is assumed that they have the upper hand. Although 60% of investors who took part in the online questionnaire thought that traditional brokerages provided a better service than their online counterparts, only 49% of investors who owned a traditional account agreed with the same statement. Thirty-five per cent of investors, who were considering giving up their traditional account because of the cheaper transactions fees of online brokerages, also said that traditional brokerages provided a better service than their online counterparts.

Although the traditional industry possesses a much better reputation for service than the online industry, there are a reasonable number of investors who have both online and traditional accounts who are still willing to sacrifice superior service for cheaper transactions. This would indicate that investors are not necessarily willing to pay considerably higher fees for better services, which would mean that the superior service argument might be a fallacy

Before the online industry can seriously contemplate replacing the traditional brokerage model with its own online version it has a number of weaknesses to overcome. The three weaknesses are. acquisition of new clients, new services to attract mainstream investors and developing multiple revenue streams to address the chronic over dependence on transaction fees.

The online brokerage industry's current strategy of spending up to 50% of revenues on customer acquisition costs is unsustainable. The industry needs to develop a method of targeting investors who will generate sufficient revenues to justify the marketing expense Although the online industry might argue that it has been very successful at attracting new clients and now boasts 15 million accounts, research has shown that a lot of accounts would actually be considered inactive The results of our interviews indicate that online brokerages would appeal to an older and more risk adverse type of investor.

Mainstream investors will require other avenues for communicating with their online brokerage than just email. The online industry will need to establish call centres, and ensure that they are staffed by knowledgeable employees who can quickly answer customer inquires. Adding call centres would also have the added advantage of allowing customers to perform trades if the Internet should become severely disrupted, which will also provide brokerages with added redundancy and help address their poor service image among some investors.

The online industry is also potentially in a much better position to offer after hours trading facilities than their traditional counterparts. Although our survey shows that after hours trading obtains a mixed response from investors.

The last issue facing the online industry that urgently needs to be addressed is its over dependence on share transactions for revenues. This effectively consigns the financial health of the whole industry to cyclical fluctuations in trading volumes. Some online brokerages derive up to 70% of their income from executing share transactions; compared to some traditional brokerages' 15% to 30%. The volatile market conditions that is being witnessed on most of the world's stock exchanges has already had a massive impact on trading volumes, which have dropped by 35% in May from the levels seen in April. Unfortunately the online industry's other main source of revenue, interest from margin lending, is also badly effected from any sudden down turn in the market.

Probably the most important reason for the online industry to diversify its revenue streams is that the costs of transactions keep falling. There are already some online brokerages that are now charging no commission for some types of transactions. Thirty-seven per cent of interviewees thought that transaction costs are going to end in zero fees.

After initially grabbing the headlines with talk of a paradigm shift in the way investors invest, and the end of the traditional brokerage industry as we know it, the online industry suddenly does not seem so sure about its future. The biggest traditional brokerages have now entered the online business, and are offering their own versions of online trading to stop their customers migrating to the online brokerages Some of them have attracted new customers with their expensive offerings.

A lot of investors are now experiencing for the first time a bear market. The 'cannot lose' mentality that has been present for so long on certain stock markets has now been replaced by a more sober climate. Whether the 35% fall in trading volume is a temporary response to the new realities of the market remains to be seen.

The online industry suddenly seems perplexed, and unsure of what to do. Whether the current realities of the markets will be a blessing in disguise remains to be seen.

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Accessing electronic information sources through computer games consoles

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This paper provides an overview of the games console market, a rapidly growing sector of the entertainment industry. An overview of the emergence of games consoles, and advances in games console technology, is given, as well as examples of the increasing incorporation of aspects of computer gaming into Higher Education student courses. Current and future games consoles are described in some detail, and their networking capabilities considered. The paper then focuses on the requirements of users of networked-based services. The first games console to come equipped with network access facilities is used in order to access a number of electronic library resources and services, and to consider the viability of such a device for this purpose. Comments on issues surrounding data exchange between electronic devices such as games consoles are given, and future developments in the games console sector, especially in relation to the remote access of electronic information resources and services, are speculated.

From Space Invaders to Sony and Sega: early gaming

Computer and video based gaming entertainment emerged in the late 1960s and early 1970s, primarily in the US. Rudimentary consoles consisting of a single, simple game could be played through a standard television; the complexity of these games, and the console processing power, was far inferior to the wristwatch-based games of the 1980s and 1990s, and the mobile phone oriented games that have emerged in the last year.

Through the 1970s, entertainment consoles and the games played through them gradually increased in several areas of functionality:

- Games became more complex, introducing colour, gradually more detailed graphics and sound, and rudimentary artificial intelligence.
- As opposed to being built into the console hardware, games could be 'loaded' or inserted into consoles. This typically involved either inserting a single-game cartridge into a port, or downloading a cassette-based game from a tape player.
- Consoles began to offer basic computing and programming facilities, often through the use of membrane or rubber keyboards. Internal RAM size was minuscule in comparison to today's machines; in the early 1980s, memory allocations of 32 to 64 kilobytes were typical.

Through the late 1970s and into the 1980s, the distinction between a games console and a home-based, or personal, computer began to blur. Even with the limited programming facilities of these hybrid console-computers, many people outside the emerging corporate computer games industry developed software, sometimes with commercial success

The popularity of computer and video-based entertainment grew steadily through the 1980s. Several computer-console hybrids, such as the Commodore VIC-20 and the BBC Micro, sold in large numbers. In the UK, the ZX Spectrum sold over five million units, and became the most significant platform for both experienced developers and first time programmers; many of today's games developers quote the Spectrum as being the machine that introduced them to game playing and creation.

The increasing popularity of home-based games playing on these rudimentary consoles was due to a number of factors:

- Parents perceived computers as having an educational value, even though most were eventually used solely for games playing. The BBC Micro in particular was used in computer studies courses in a large number of schools, thus encouraging parents to purchase one for their children's educational benefit. Ironically, one of the most revered games in the history of this media, Elite, first appeared on this platform and had a marked effect on computer sales.
- People were familiar with computer games from their experiences in amusement arcades, especially in seaside resorts. Arcade games such as Space Invaders and Pacman emerged in a myriad of forms on all of the popular consoles and home computers.
- Games were relatively cheap to buy in comparison to playing them in video arcades. In the early 1980s, a cassette-based game cost between five and ten pounds; this was often less than what would usually be spent in an afternoon in a video arcade.
- Computers, computing and related technologies became a significant part of popular culture, with programmes such as Tomorrow's World captivating audiences with what seemed like miraculous computer-enabled applications. Films such as Star Wars had a significant affect, both on the perception of computers, and as an influence on emerging game genres and design.

As the 1980s progressed, so games storage facilities improved. Whereas games took several minutes to download from a cassette tape into systems such as the Spectrum or Commodore VIC-20, systems such as the BBC Micro and the Amstrad range of computers included proprietary disc drives, enabling games to be loaded in seconds, and 'player positions' to be easily saved during a game.

However, few games consoles and hybrid console-computers offered a means of remote game playing: players were required to sit close to a system, using a joystick or other games controller. In short, all of the players of a game had to be present in the same room as the television to which the console was connected. Similarly, nearly all consoles and computers lacked any kind of networking or remote communication facility, such as that offered through a conventional modem. It should be remembered that even as recently as the 1980s, the Internet and remote networking were not widely used or developed; modem-enabled communication was feasible, but was usually restricted to the dedicated hobbyist due to its relative complexity and the lack of online services.

Through the late 1980s and early 1990s the PC as a multi-application system emerged, and was used for both home and business purposes Significantly, with the increasingly rapid development of network-based services and resources, the PC could be used for activities such as email, ftp and gopher. Bulletin boards and online virtual meeting environments (the first 'chat rooms') thrived. Inevitably, online gaming increased in popularity, especially through the 'Dungeons and Dragons' genre. People were able to play games against other people, their physical location – be it the same street, town or country – being irrelevant. Such activities could take place on a machine also used for work purposes, such as word-processing, desktop publishing and research work

During this time, hybrid games consoles, i.e those that offered computing and programming facilities to the home user, became less popular (with the notable exception of the Commodore Amiga range). In their place came more powerful consoles that enabled increasingly complex graphics and 'gameplay'. These could be operated in a much more straightforward manner than previous models, and were gradually reduced to little more than a simple port or drive to insert a games cartridge or disc, and an on-off button.

By the early 1990s, many console manufacturers had withdrawn from the sector, most due to poor sales attributable to the lack of games available for their particular platform. However, three manufacturers in particular enjoyed increasing success and became the predominant games console manufacturers of the decade Nintendo, Sega and Sony.

The expansion of the games sector

The computer and video games market has grown steadily throughout the 1990s in most developed countries In the UK alone, the market was worth some £240 million in 1990; this is expected to grow to over £1.5 billion by 2001 [1]. New consoles and eagerly anticipated games are increasingly in short supply at launch [2]. The games sector has become a part of the mainstream entertainment culture.

The 1990s have seen the emergence of far fewer games consoles than other decades, the significant models being:

- The Sony Playstation, a CD-based system More Playstations have been sold than any other console in history. At the end of 1999, nearly 80 million had been purchased worldwide and, despite sales slowing during 2000, the console still outsells its rivals. The Playstation was launched in Japan in 1994. Despite the processing technology being inferior to competing consoles, such as the N64 and the Dreamcast, many developers still produce games for this platform, therefore ensuring a relatively large selection of games for customers.
- The Nintendo 64, or N64. Launched in 1996, this console has sold roughly 25 million units to date. A lack of software, due to the more expensive cartridge-based software system that the console uses, and the relatively high development costs, has meant that sales of the N64 have been slower than those of the Playstation.
- The Sega Dreamcast. Launched in 1999, the Dreamcast is approaching 10 million unit sales worldwide. The Dreamcast is the first console to incorporate 128 bit technology, thus permitting a new level of graphical detail, smoothness and realism. An infrequent stream of high quality games (often faithfully reproduced arcade game conversions), as well as price-cutting to £150 by the autumn of 2000, has helped the Dreamcast sell steadily.
- The Playstation2. As with most games consoles, the Playstation2 was launched in Japan before being released in the US and finally Europe. This particular console slightly outperforms the Dreamcast and can accept DVDs; this has encouraged sales in Japan, as many people use the console primarily as a cheap DVD player, with game playing taking a lesser role. Crucially, the Playstation2 can also accept CDs and is compatible with Playstation (one) games, therefore inheriting a large compatible software market on launch. However, the Playstation2 has been widely criticised as being a difficult platform on which to develop games [3], a factor which may influence the quality and quantity of released games.

Two new consoles will be appearing in the next few years:

- The GameCube is the successor to the N64. This will be available in late 2001. Unlike the Playstation2, it will not be able to play DVDs, instead using proprietary 8cm game discs. First pictures of the GameCube reveal an unusually small design (resembling a purple shoebox), and featuring wireless television connections and games controllers [4].
- Microsoft will launch the X-Box during 2001/2002. The technical details of the X-Box hint at a console that is significantly more powerful than the Playstation2 and Dreamcast [5]. However, not all of the technology that will be included within the X-Box currently exists, leading to speculation in the industry regarding its final configuration. The addition of the hard drive raises the question of whether the X-Box is essentially a games console with an added storage medium, or whether it is an extremely high performance PC with the functionality of a console. A co-developer of the X-Box said, 'We [realised we] could produce something just like a console, but with all the advantages of a PC' [6].

By the end of 2001, it is likely that there will be four main consoles, each with sales measurable in millions. Industry estimates vary considerably as to the number of consoles sold more than a year into the future, though a 'ballpark figure' of around 50 million units by the end of 2002 is accepted as being realistic.

All of these consoles will offer network-based methods of game playing, enabling individuals in different locations to play games against each other. Industry monitors have speculated that console manufacturers have no choice but to offer the best online functionality possible; this is due to previous experiences in the sector, where no more than two consoles at any one time have achieved large and sustained sales [7]. Offering online gaming enhances the attractiveness of games, and therefore the console(s) on which the games can be played.

In addition to online gaming, console users will be able to access the Internet, and services and resources connected to it. As the cost of games consoles has always been considerably less than that of the PC, several questions come to mind:

1. Will a games console offer similar functionality to a PC with respect to accessing online resources?
2. What proportion, or number, of people will use a games console to access online resources?
3. Should website creators, and developers of networked-based resources and services, take note of games console browsers?

Games and the education sector

In recent years, the number of academic courses dedicated to aspects of computer and video game programming, design and production has greatly increased. In UK Higher Education, there are a number of computer game related undergraduate courses; most combine some aspect of game creation with a related subject, such as marketing. Curiously, most courses that explicitly focus on aspects of computer game creation are located in the 'newer' universities (those institutions that until a few years ago were mostly polytechnics). For example, the University of Teeside offers degree-level courses in computer animation and computer games design [8], while the University of Lincolnshire and Humberside offers a degree-level course in computing games, simulation and virtual reality [9].

Some universities are developing centres of research dedicated to aspects of computer game development, as opposed to the subject area being subsumed into a computer science or IT research portfolio. For example, the University of Abertay in Scotland is host to IC CAVE [10], the International Centre for Computer and Virtual Entertainment, within which research into many aspects of computer gaming, such as networking gaming, game prototyping and artificial life techniques are undertaken. The department also offers degree courses combining computer games technology or arts with Japanese oriented subjects such as language and culture, therefore assisting students in working within the Japanese games industry and appreciating the context of computer gaming within the Japanese culture

Network issues

When using a browser such as Internet Explorer or Netscape, or some other enabling software, to interact with services and resources over large area networks or the Internet, three main criteria affect the success of this interaction.

Speed

Information download needs to operate at a reasonable speed. A large number of factors affect the speed of information download, including:

- the efficiency of the browser;
- the processing power of the client computer;
- the capacity of the modem, and the bandwidth of the connection between the computer/modem and the Internet Service Provider or service host computer; and
- caches, at any point between and including the client computer and the service host computer.

As can be seen, some of these factors are beyond the control of the user, or the client computer or browser/enabling software.

Stability

The browser and the client computer need to be stable, i.e. they need to function normally without 'crashing' or interrupting data download. Stability is paramount when carrying out tasks that require large files or data structures to be downloaded, such as documents in PDF format. During game playing stability is required so that, throughout the game, the player does not become disconnected from the gaming environment.

Functionality

The browser, or the client computer, needs to offer a range of functions compatible with the information processing requirements of the user. The browser should either recognise the types of data needed by the user and provide inbuilt tools to manipulate this data, or allow the data to be downloaded so that it can be manipulated by third-party tools.

The relative importance of the aforementioned criteria differs according to application. For simple low-data Internet-based tasks, such as email, stability is the primary criteria. For playing games online, both speed and stability are paramount; during a game, a fast connection is essential to ensure that no player is disadvantaged due to slow data transfer between his or her console and the game host computer. Functionality is of little importance, as all of the data processing and tasking is carried out by systems built within the console, the host computer and games software

However, for general academic or research work the priorities are markedly different, as all three criteria are important. Researchers will typically use a range of network-based services, resources and tools, including email, the Web, subject gateways, electronic journals, data sets, ftp clients, and a large range of other entities. During their work researchers will often encounter data and information in several formats, such as HTML, Word, PDF, numerical data sets, and so on. In turn, these formats typically require a range of software tools to allow manipulation of the data, such as a viewer for PDF files. Therefore, the functionality of the browser and associated tools is a higher priority to the researcher than to the games player, who essentially requires just a fast and stable connection from their console to the gaming environment host computer.

Services through a games console: the Dreamcast

As outlined above, the Sega Dreamcast is the first dedicated games console to offer Internet access. The World Wide Web browser is provided on a CD-ROM; as the Dreamcast possesses no hard drive, the CD-ROM drive is in constant operation whilst the browser is being used. The browser is developed by Sega, the console manufacturers, and is usable only on the Dreamcast.

We used the browser to interact actively with 20 web-based services. Services with facilities beyond a collection of static HTML-based web pages were chosen; specifically, we identified services that offered:

- Searchable databases, such as subject gateways with searchable catalogues of resource descriptions National cross-subject based gateways, such as BUBL [11], and individual subject gateways, such as SOSIG [12], are prime examples of this genre.
- Files for downloading in a variety of formats. The MIMAS [13] service offers a large amount of literature in a variety of formats to assist users in downloading and manipulating data sets. In addition, the UK Mirror service [14] makes available a searchable collection of software and files, otherwise available from overseas websites, thus reducing download time and cost.
- Access to OPACs and other bibliographic databases that were not originally designed for incorporation or access through a website.

The services that we chose were UK-oriented electronic library services, developed by and for the Higher Education sector. Many of these services would form part of the emerging Distributed National Electronic Resource [15], and were therefore likely still to be in existence in a few years' time, when network-enabled games consoles will be more prevalent.

As an additional testing factor we compared the performance of the Dreamcast with that of a PC connected to an academic network, and a PC connected to an Internet Service Provider via a modem. However, it should be borne in mind that many extraneous factors, such as the amount of traffic using the same network at any particular time, could affect the performance of network-based work During our experiments we attempted to minimise these factors by performing online tasks at the same time and day of the week.

Speed

Our experiences using the Dreamcast were variable, with respect to speed. The Dreamcast contains a detachable 33Kb modem, and therefore will take a substantial amount of time to download large files. However, all 20 of the websites loaded in a reasonable time, with no excessive delays. This may be partly due to academic websites being relatively simple in terms of their structure, size, and overall complexity, especially when compared to the websites of many large US companies.

On the other hand, interrogation of databases such as subject gateways was distinctly slow, with the browser sometimes seeming to struggle to display the results. In addition, we were unable to test the speed at which various files were downloaded, as the file formats were not supported by the browser (see *Functionality*).

Our experience using the PC connected to an Internet Service Provider via a modem was similar with respect to accessing websites; however, searching of network-based databases was significantly quicker (taking less than 60 per cent of the time of the Dreamcast browser in three cases). In addition, the PC was able to load files of any kind, though, not surprisingly, large files took considerably longer to download than short files.

Not surprisingly, the network-based PC fared best of all: all websites were displayed quickly, database searches retrieved results in a reasonable time, and large files of differing formats downloaded rapidly.

However, when the speed of the overall process was taken into account, the picture became less clear. The Dreamcast, as with all consoles, is built on the principle of 'simplest is best', and consists of one box comprising several ports and two buttons. From turning on the console to being actively online took less than 30 seconds and a minimum amount of user involvement. The user does not and cannot interact with any complex operating or Windows-based system. Similarly, connecting online is simple (and therefore quick), as the console automatically connects to the (sole) games-oriented Internet service provider for Dreamcasts in whichever country you reside.

Connecting via the PC (especially via the modem) was a more 'hands-on' experience, taking several minutes from when the machine was switched on. Waiting for the operating system to run, finding the application for dialling to an ISP, and selecting an ISP were considerably more time consuming and involving than via the games console approach.

Stability

Of the three platforms tested, the games console proved to be the most stable. During our experiments the console did not 'crash', and the modem-based network link was never disconnected. However, it should be pointed out that many of the more challenging tasks, such as downloading files of an exotic format, could not be carried out (see *Functionality*) and therefore the console was tested under less stressful conditions than those imposed on the PC-based systems.

The connection from the PC with the modem failed several times, even though two different Internet Service Providers were used. The browser (Netscape) also 'froze' when we attempted to download a large PDF file, but it was unclear whether this was due to the browser, computer, ISP, or some other factor.

Perhaps surprisingly, the networked PC proved to be the least stable environment of all, with several browser 'freezes', one browser 'crash' and one Windows/PC 'crash' during the experiments Most of these problems occurred either when we attempted to download large files of an exotic format, or when the browser detected that a 'plug-in player' was required to view some part of a website and attempted to download and install the viewer.

Functionality

The Dreamcast-based system offered severely limited functionality for the purposes of our experiments. In particular, many files could not be downloaded and either stored on a PC, or viewed in some application as the relevant application was neither built into the browser, nor provided on the CD-ROM. Files in formats which are commonplace, such as PDF, could not be downloaded, saved or viewed.

In addition, several websites could not be fully viewed due to the lack of 'plug-in viewers'. While academic sites are largely free of facilities requiring such plug-ins, a much higher proportion of entertainment and commercial sites increasingly rely on the user possessing them.

The PC connected via a modem and the networked PC both fared better. Most files that were downloaded were viewed without any problems, although some of the more exotic datasets required specialised viewing and manipulation software to be downloaded

Our conclusion, from this informal experiment, was that both the networked PC and the PC connected via a modem to an Internet Service Provider offered more than adequate functionality for locating, retrieving, downloading and manipulating a large variety of resources from the Internet However, the stability of the platform was occasionally questionable.

On the other hand, the games console was clearly unsuitable for the tasks involved in academic research. While the games console/browser configuration was sufficient for simple website browsing and online (web-form enabled) database searching, it was unable to offer essential functionality, such as the ability to download, view, save or print files of a variety of formats. In fact, using the console highlighted just how many additional functions, on top of basic web browsing, researchers often require when using the Internet to retrieve information.

Information exchange

The development of several aspects of the information *processing capabilities* of the new generation of games consoles is a key part of their attractiveness, enabling more complex and realistic games and simulations to be developed.

This differs from the information *exchange capabilities* of these consoles. All of the new or emerging consoles will allow games to be played online. This is not surprising, as many industry experts predict 'real-time online gaming' through consoles to become a mainstream component of the gaming sector [16].

The X-Box will provide Broadband networked access as standard, while it appears to be an optional extra in both the Playstation2 and the forthcoming GameCube. The use of this technology will allow games console owners to play against each other, usually through centralised proprietary games console (Internet) service providers, with only a fraction of the delay often suffered by online games players using conventional modem and phone line systems connected to their PCs or Dreamcasts.

However, this system is restrictive, as extra tools and functionality are required to exchange information more freely. For example, I can use my Dreamcast to play online against a specific player, through the gaming hub or service. However, if I want to send a file of any kind to that player I have to use my PC for two reasons:

- The PC allows me to use an application-based mechanism, such as FTP, or email that provides an attachment facility, in order to send the file.
- I need to use an application that allows me to send an item to an identifiable location, such as server or file space belonging to that player

Games consoles often possess some kind of idiosyncratic or proprietary information exchange system. For example, the Dreamcast features a small detachable unit with a low resolution LCD screen. Called the VMU (Visual Display Unit), this enables players to store game positions and other games-related data, and exchange with other players by physically connecting the units. In addition, game positions, high scores and other game-enabled data can be uploaded from the VMU, through the console (when online), to the proprietary games-based Internet service provider. From here other players can download the files to their own VMU; what they cannot do is download and store non-standard files, such as PDF files or QuickTime movies.

A parallel and rapidly converging market sector relates to mobile phones. The latest generation of mobile phones uses WAP (Wireless Application Protocol) in order to view specially configured websites and other network-based services and resources. This fast-growing communications technology is beginning to overlap with the gaming sector, as several software houses are either developing games for network-enabled phones, or examining the feasibility of this concept. Crucially, both Sega and Sony are forming alliances with mobile phone and phone network providers in order to exploit another media for games playing potential. The deal between Sony and DoCoMo is of particular interest, as the partnership will explore the possibility of developing services that will 'link' a games console and a cellular phone [17]. Of particular interest will be the range of information types capable of being exchanged between the two media, and the data transmission rates.

It should be noted that the PC, games console and the mobile phone will not be the only electronic devices in the next decade that are network enabled in some manner. Television-based desktop boxes, increasingly commonplace due to the proliferation of cable and satellite TV, offer web and email facilities. In-car systems, allowing passengers to access the Internet while in motion, are in development, as are more exotic and niche devices, such as 'intelligent' or networked clothing. Of great significance is Bluetooth, a standard that allows devices to communicate over small distances via short-range radio. This could enable domestic devices to communicate online, through a central network point somewhere in the household. Therefore, it would be feasible (though of questionable need) for a person to operate their major kitchen appliances through their games console.

Future developments and conclusions

In addition to enabling online gaming, the emerging generation of consoles will also feature a range of facilities that will add new, albeit often specialised, functionality. These include:

- Enhanced entertainment integration. The Playstation2 in particular is being marketed not as a games machine, but as the central part of an entertainment complex. The console allows the owner to watch DVD movies, play CDs, and connect other audio and visual hardware through a variety of ports to form a more converged entertainment system.
- Significant data storage. Intriguingly, the X-Box will contain an 8Gb hard drive, increasing possibilities for data storage and faster game play The primary use of the drive will be to act as a temporary storage medium for multimedia files and fragments Access to a hard drive is much quicker than access to a CD-ROM or DVD; therefore, in-game graphics and other multimedia items can be loaded during 'gametime', thus allowing for more realistic visual effects.
- Larger in-console data retrieval systems. The Dreamcast uses a CD-ROM [18], while the Playstation2 and the Microsoft console will use the more powerful DVD-based system. The latter of these systems also enables the playing of movies. The Nintendo GameCube will use a proprietary small disc storage mechanism in keeping with the overall 'miniaturised' concept of this console.

Our conclusions regarding the use of games consoles for accessing electronic library services, or for carrying out other kinds of academic or research work are that:

- The prioritisation of download speed, propagated by computer games magazines in particular, is correct for computer game applications but incorrect for information retrieval and other network-dependent tasks. The functionality of the web browser provided by the games console would need to be near that of the PC; the ability of the games console browser to recognise files and 'plug-in viewers' of a much wider range of formats is required.
- The ability to download, save and exchange files in some manner is also required Even if a browser enables a person to download and manipulate some non-HTML file, there is still often an end-requirement to save, or print, the resulting output of that manipulation. Most conventional games consoles can be enhanced by the use of memory cards, via which game positions can be saved. However, these possess a relatively small amount of storage space (certainly less than what is required to store a large word-processed document).

Paradoxically, to achieve these two goals would require games consoles to become much like Personal Computers in terms of facilities, features and functionality.This is because we have defined the enhancements required of games consoles in terms of the PC, a system with which we are, in part, familiar and tolerant. Whether manufacturers would wish to compromise, or dilute, the advantages of their games console (simplicity, stability and cheapness) for non-games uses is a debatable point

Perhaps the issues raised in this article lead us to another question: is it desirable for the games console to develop into a PC-like system, or is it desirable that the PC, like the games console, becomes more affordable, easier to use, and stable?

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Wired in Whitehall: a survey of Internet and intranet use in government

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A questionnaire survey giving details of Internet and intranet use in 23 government departments. The survey found considerably increased access to the World Wide Web on the previous survey and the widespread existence, but erratic implementation, of web use policies Training in Internet searching was becoming a significant activity for many libraries. There was little involvement by library staff in departmental websites; with considerable use being made of external consultants when designing, setting up and restructuring sites. Email was proving to be a standard tool within government. Intranets were becoming more prevalent and there was broad recognition of the relevance of information management skills to the development and management of intranets. There were unrealistic expectations of intranets and a widespread belief that intranets are not used to their full potential. However, there was universal agreement that the intranets are very positive additions to organisations.

Introduction

In autumn 1999 the IT Working Group of the Committee of Departmental Librarians carried out a survey looking at Internet and intranet use by government departments and agencies. It was similar to a survey that had been carried out in 1997 [1], and allowed government librarians to assess the inroads that this rapidly developing technology had made into the government library and information sector. The questionnaire was extensively revised for the second survey and included a more extensive section on intranets, which had developed significantly in many organisations in the intervening two years. Twenty-three responses were received from government departments, agencies or parliamentary bodies. The survey looked at the Internet in the organisation, the Internet in the library, email, training and support and intranets.

The main findings were:

- considerably increased access to the World Wide Web;
- the widespread existence, but variable implementation, of web use policies;
- training in Internet searching becoming a significant activity for many libraries;
- little involvement by library staff in departmental websites;
- considerable use being made of external consultants when designing, setting up and restructuring sites,
- establishment of email as a standard tool within government;
- considerable growth in the prevalence of intranets;
- belief by respondents in the relevance of information management skills to the development and management of intranets,
- unrealistic expectations of intranets;
- widespread belief that intranets are not used to their full potential;
- universal agreement that the intranets are positive additions to organisations.

Methodology

A questionnaire was mailed to 40 government departments, agencies or parliamentary bodies asking for them for information on the Internet in their organisation and library, email, training and support and intranets The sampling frame for this exercise was members of the CDC IT Committee. Twenty-three questionnaires were returned, giving a response rate of 66%.

Part 1: Internet in the organisation

Web browsing

The survey revealed a substantial increase in the availability of web browsing to staff in government departments and agencies. In 1997 very few organisations allowed Internet access from networked PCs due to concerns about security, cost and the threat from viruses. By 1999 however, over half of responding departments had Internet access from all or some networked PCs. The development of the Government Secure Intranet (GSI) made a considerable difference to attitudes to enabling web access. The GSI enables departmental networks to be linked to the Web in a secure way through a single, centrally managed firewall. Security and resource concerns were still apparent though, as some organisations still remained wholly or partly dependent on stand-alone PCs. The survey did not find any organisations with no web access at all.

Controls on web use

Most organisations had clear written policies relating to web use or had policies under construction. The main concerns reported were·

- accessing offensive or pornographic material;
- accessing material for personal use;
- downloading programmes that could interfere with existing IT systems.

Those that did not have web use policies were all smaller organisations with stand-alone Internet access only. Generally the policies were fairly comprehensive and well disseminated throughout the organisation.

Cyber cafés

The development of cyber cafés on the whole was in its infancy; they were rare, small, and only one of them offered coffee or other refreshments. They were used for both work and personal activities, but not as training facilities. They were proving to be popular though; several departments had plans to implement them and those with existing ones were planning to enlarge and improve them.

End-user searching

The survey revealed a major shift in attitudes to searching the Web. In 1997, in half of the organisations surveyed information professionals rather than end-users were encouraged to carry out the searches. Resource constraints were quoted as being one of the main reasons for this. By 1999 more users had ready access to the Web and were confident enough in their own abilities to do their own searches. This has some implications for the future of the profession of librarianship, as many straightforward enquiries are carried out directly by those needing the information

Part 2: the Internet in the library

As in 1977, all of the libraries used the Internet for enquiry work, most regarding it as either essential or useful. Although most libraries found it essential or useful for non-enquiry work, several did not use it for other purposes at all, surprising in view of how useful it was for such work as purchasing, bibliographic reference checking, professional development and downloading software.

Over two-thirds of libraries produced search aids for the Web in a wide variety of formats. There had been a large increase in the number of libraries producing printed lists, databases and pages on their intranets. Lists of useful sites were produced more often than search instructions or other information.

Although the Web was used by just under half of the respondents for Selective Dissemination of Information (SDI) searches, these were additional to, rather than instead of, hard copy services. One larger department had even started getting users to do their own SDI, with guidance from library staff. This is interesting given the volume of information being added to the Web and the poor quality of much of the information. Web based SDI services may be a fruitful area for other libraries to explore, particularly in highly specialised subject areas where searches are less likely to deliver an unmanageable volume of poor quality information.

Part 3: email

As with Internet browsing, only 70% of organisations had a clear policy relating to email use, even though email had established itself as a standard tool within government. This is a matter of some concern as legal repercussions have arisen in other organisations where libellous or offensive messages have been sent. There was also inconsistency between departments regarding the coverage of these policies and how effectively they were implemented. The main issues covered by policies were:

- personal use;
- offensive or libellous messages;
- the size and type of file which could be sent.

The monitoring and enforcement was erratic, and there may be a need for cross-governmental guidelines on setting up and implementing email policies.

Most of the respondents said their organisations had generic email addresses, which the public could use, although on the whole these were not publicised very widely. As electronic communication with the public is a requirement of the Modernising Government programme, this situation should change quickly In just under half of cases the library was responsible for responding to enquiries received in this manner. In all cases the response time expectation was the same for email enquiries as it was for enquiries received by other means.

Part 4: web training and support

Training in this area had improved a little, with 40% of respondents considering training in their organisation as a whole to be adequate, as opposed to 29% in 1997. Within the library itself 63% considered training to be adequate. This was still far from ideal but indicated that we were moving in the right direction. It also indicated how much more important information retrieval via the Web was to library staff than to many others in the civil service, as time was clearly devoted to training staff in its use. As in 1997, training for most staff was not an automatic part of their induction, but was done on request.

Training in retrieving information from the Web has developed into a significant activity for many libraries over the last two years Over two-thirds of the respondents said that the library provided introductory training for end-users. A third also provided advanced training or training in specialist areas, in only a few organisations was information retrieval training provided by the Training or IT department, and then only at an introductory level. This reflected a widespread recognition that searching the Web is not primarily about using a software package, but about applying information retrieval tools and techniques

Only a few libraries provide any sort of technical support for Internet PCs, and this was nearly always limited to setting up and managing accounts with Internet service providers.

Part 5: websites

All of the organisations had their own websites. Of those able to provide an answer, 60% said their server was outsourced, a very similar figure to the 66% who were outsourcing in 1997. In 68% of organisations libraries had no input at all into the websites, even information management and indexing were usually left to IT or other sections. A few organisations had special sections set up to manage their sites, but there was little to indicate that information professionals were automatically included in these teams.

Management of websites

Table 1 shows the sections responsible for various aspects of website management in the responding departments

Libraries had slightly more responsibility than these figures initially indicated, because where special teams were set up to take overall responsibility for all aspects of the site, information professionals were sometimes included on the team.

Table 1 *Website responsibilities**

TASK	**Senior management**	**LIS**	**Publicity**	**IT**	**Special web team**	**Out-sourced**	**Department creating information**	**Other**
Website policy	39.0	13.0	30.0	9.0	26.0	4.5	0	0
Design	0	17.0	43.0	22.0	17.0	17.0	0	9.0
Information management	0	22.0	26.0	17.0	22.0	17.0	0	4.5
Editorial control	0	17.0	35.0	4.5	9.0		30.0	0
Mounting of data	0	9.0	4.5	4.5	13.0	22.0	22.0	4.5

*All figures shown are percentages

The predominance of press and publicity sections managing government websites contrasts with academic institutions, where prime responsibility usually lies with the library. In part this reflects the emphasis in government on presentation. However, it is unfortunate that library staff are not more heavily involved in this area, there is scope for librarians' expertise in the area of information organisation and management to be more widely recognised and used.

Most organisations used consultants at some point, particularly for the design and preparation of the pages and technical advice. Consultants will be pleased to hear that one of the few who did not use outside help described their site as 'one of the worst'.

Efforts made to ensure the site was found were patchy. Most were registered with the main search engines, Alta Vista and Yahoo being mentioned the most URLs often appear in publications and on stationery, and links from other sites were depended on, and sometimes actively sought. Only two organisations specifically mentioned metadata, although use of this should increase as information retrieval on the Web is looked at more carefully, pan-governmental standards are developed and XML becomes more predominant.

Evaluation of sites was also patchy. Only a few organisations evaluated their websites either regularly or as a one-off exercise. In 90% of cases the evaluations had led to major changes being made, indicating that they were valuable exercises. User surveys were the most common method of evaluating sites.

Part 6: Intranets

Growth of intranets

The most striking change since the previous survey was the growth in the use of intranets, with 90% of organisations having introduced one by 1999, compared with just 35% two years previously. In most cases desktop access to the intranet was made available to nearly all staff in the organisation

Objectives

The main objective in developing an intranet was to improve communications within the organisation. Other reasons included:

- improving efficiency and productivity;
- implementing an information management or IT strategy,
- reducing printing and distribution costs.

Development and training

In planning the intranet, about half the organisations undertook an analysis of user needs and a cost analysis, with a small number carrying out an information audit. Many organisations initially developed a pilot system rather than trying an office-wide roll out in one step.

Training is an important aspect of introducing an intranet, but there can be a perception that intranets are user-friendly enough to require little input All organisations did some form of training, the main method being demonstrations, with formal training sessions being provided in just under half of the organisations. However, the survey revealed that many respondents felt there was a lack of understanding of how to use the intranet, so training perhaps needed to be tackled more seriously. As with the Web, training in information retrieval strategy is as important as learning how to use the software.

Management

In contrast to the management of public websites, no press and publicity sections were responsible for managing the intranet. IT departments were responsible in one-fifth of organisations, libraries in just under a third, and about half were managed by information management or publications sections. While most respondents felt that information management skills were highly relevant to the successful development of intranets, the organisational units in which these skills were being applied were often not traditional libraries, but units with responsibility for managing the provision of electronic information on internal computer networks.

The implication for librarians is that they need to be willing to expand their vision beyond the confines of traditional library services, to market their skills and to respond to the rapidly developing demand for end-user access to electronic sources of information, both within and without the organisation Failing to do so risks marginalisation of library and information specialists, and an increasingly difficult battle to justify the resources being consumed

Content

In managing the intranet content, 55% of respondents took a centrally managed approach, with all updates being filtered through a central unit. Others took a decentralised approach, where individual sections of the organisation were able to manage and update sections of the intranet themselves, subject to central guidelines. This approach will probably increase as use increases and content becomes too great to be managed by a single central unit. Three-quarters of organisations had a standard look and feel to their intranet pages.

The most popular materials on the intranet were job vacancies and office circulars, closely followed by the staff directory Almost all of the intranets had a search facility, and most had online help and feedback facilities. Just under half had links to the Web, and a quarter used some form of push technology such as delivery of online press cuttings. A quarter supported discussion groups, but only a small number of organisations reported using the intranet for knowledge management, and just one had an online chat facility.

Success of intranets

Respondents were asked to indicate to what extent they agreed or disagreed with a number of statements about their intranet, and this proved to be one of the most interesting aspects of the survey. On the positive side the intranet was generally considered to have improved communications, running costs were considered to be low in relation to the benefits, and there was universal agreement that the intranet had been a positive addition to the organisation. On the negative side 60% of respondents disagreed that the intranet had improved efficiency and productivity – one of the main perceived benefits of intranets This may have been because many of the intranets had only recently been introduced and the benefits had yet to filter through, but it is a matter for concern and may be worth further investigation. Many organisations reported that there was resistance to changes in working practices from some staff, that the information on the intranet was not well structured and organised, and that information could be difficult to find. Most organisations reported that users had unrealistic expectations and, perhaps most worryingly, over 80% of respondents reported that there was a lack of understanding of how to use the intranet.

User reception

Some of the negative points related to the introduction of the intranet and the changes involved in this process: most respondents felt there had been unrealistic expectations from users. User expectations need to be carefully managed in any information systems project, and intranet users are particularly prone to basing their expectations on their experience of sophisticated commercial websites. In general, government organisations cannot justify devoting the level of resources needed to develop and maintain the state-of-the-art websites which commercial organisations increasingly regard as essential to their businesses, but consultation, training, effective support and internal marketing of the system can help to address some of the difficulties The survey showed that most organisations had done a certain amount of training and internal marketing, but the low levels of understanding and the unrealistic expectations mentioned above indicated that perhaps more input in this area was needed.

Knowledge management

The survey also found a fairly high level of resistance to changes in working practices by staff. Resistance to change can be a problem with any new system, but is perhaps particularly a problem with intranets where making best use of the technology may entail re-engineering business processes Organisational structures and procedures which have evolved for creating and managing paper-based information may no longer be appropriate once an intranet is introduced. Successfully introducing an intranet is more than just managing new technology or even managing information: it involves change in the structure and culture of the organisation A knowledge management (KM) environment needs to be introduced where staff are encouraged to value and share information, and are trained in the information literacy skills of creating, finding and using information. This can be the most difficult aspect of the whole project, but without this the concept of the intranet will not be fully understood and the intranet will not be used to its full potential

Symbiotically, intranets are of key importance to knowledge management projects as they provide a key framework on which a KM system can be based. While KM ensures the right culture for information literacy and intranet application, intranets provide knowledge management principles with a technological solution. Many organisations have already begun to initiate KM projects as the value and business benefits of KM concepts are being recognised, and central government projects such as the Modernising Government initiative push it forward. However, the fact that the survey showed there were problems with understanding and using the intranet, there was resistance to changes in working practices, and that only a small number of departments had introduced or were using their intranets as part of a knowledge management strategy, indicated that organisations still had some way to go in achieving a knowledge management environment.

Information retrieval

Some of the perceived problems concerned the organisation and retrieval of information. The hypertext used in intranet web pages provides the ability to link related ideas and concepts in documents in a way that was not possible with previous generations of information retrieval systems, but creates its own problems in that there are numerous different ways of structuring information and linking documents The designing of effective keyword search facilities and the use of underlying thesauri and meta-tags embedded in web pages for indexing and retrieval purposes is of key importance. While websites are superficially very different from traditional text retrieval systems, the basic problems are much the same whether the documents in the collection are linked by hypertext or not. These are problems that are well recognised and understood by information specialists. The fact that Internet technology lends itself to attractive graphics means there is perhaps a danger that presentation of information can receive more attention than designing and structuring the intranet to support effective searching and retrieval The survey showed that half of the respondents believed that the information on the intranet was not well organised or structured and that library staff often were not involved in the setting up of intranet projects. Many respondents believed that information professionals could make a significant contribution to intranet projects.

Future developments

Overall the survey demonstrated that the use of the Web as a source of information and of intranets as internal information systems had increased significantly in government in the two years 1997-99. Desktop access to the Web had become the norm, and commercial online services were increasingly being searched using a web-based interface The growth in intranets had been especially dramatic, but many organisations encountered a number of common problems These revolved partly around difficulties in structuring information effectively and establishing effective search facilities to supplement hypertext navigation. Unrealistic expectations, lack of understanding and ineffective use by users also appeared to be issues in many organisations, showing that greater focus on users and workplace culture may be necessary in future. The skills of information specialists were felt by respondents to be highly relevant to the management and development of intranets and these staff are increasingly working in information management roles outside traditional libraries.

Many of the problems of information structuring and retrieval demonstrated here have been widely recognised in government, and attempts are being made to develop standards to combat the problems, allowing government officers and members of the public alike the ready access to information promised by the technology. Guidelines on websites, covering management, content and accessibility, have already been published. Projects underway include.

- the creation of an interoperability standard, which will more than likely be based on XML;
- a metadata standard incorporating Dublin Core principles;
- a pan-government thesaurus.

Much of this work is carried out by the Central IT Unit (CITU) [2] in the Cabinet Office, and is supervised by the Information Age Government Champions [3].

Looking to the future there is every reason to believe that the ubiquity of the Web as a source of information will continue to grow over the next few years. In the near future it is likely that commercial online services will be exclusively accessible using web browsers, and this is likely to increase the trend towards end-user access to commercial electronic sources of information. With almost all government organisations having developed an intranet there is likely to be a period of expanding, refining and developing these facilities. It seems unlikely that the pace of change will be slow, and information specialists will need to be flexible and responsive to the opportunities that this change presents if they are to continue playing an essential role in their organisations.

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A user evaluation of Subject Based Information Gateways: case study ADAM

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Nowadays, end-users have quick and direct access to a massive amount of information available on the Net. However, this information is unorganised expecting users to be able to identify and evaluate it in accordance with their information needs. Subject Based Information Gateways (SBIG), organised collections of networked information, provide users with a catalogue of authoritative Internet resources, which can be searched and/or browsed. This paper provides an evaluation of one such gateway – the Art, Design, Architecture & Media Gateway (ADAM). It provides information on who these digital users are, how often they use the service, what their reasons for use are, which search methods and services provided they prefer and what are the advantages or disadvantages of an online information service

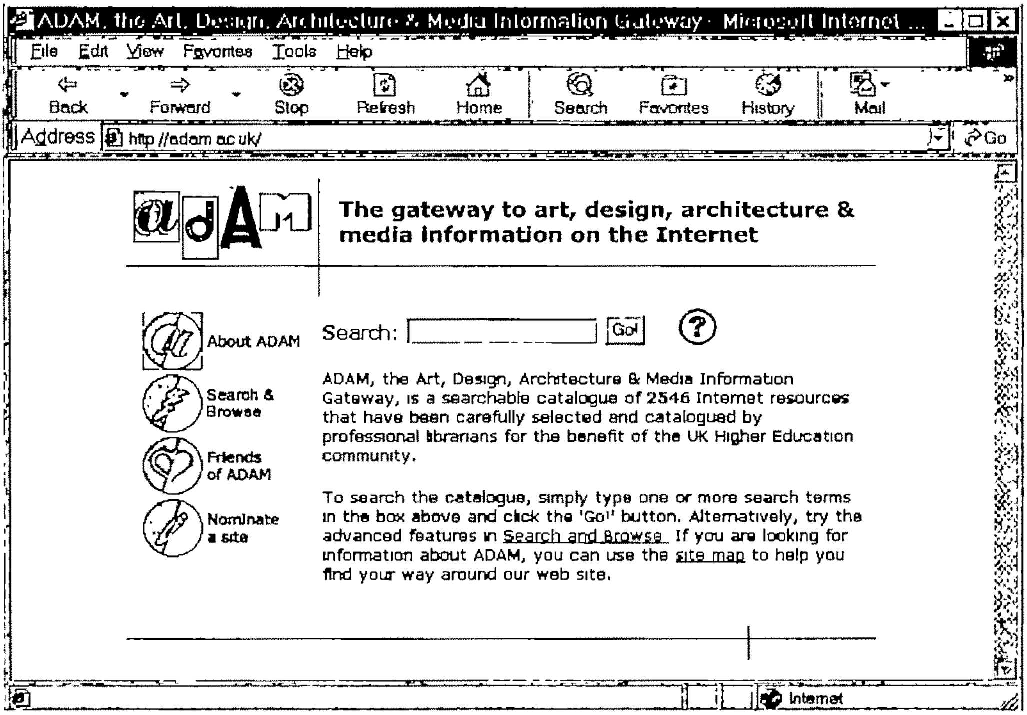
Introduction

In the traditional information environment human intermediaries, such as librarians and information scientists, find, analyse and evaluate information so that end-users are able to search organised collections of knowledge. Nowadays, end-users – thanks largely to the Internet – have quick and direct access to vast amounts of information. This information comes in various formats, so that people are able to obtain a variety of data, such as sound recordings, texts and videos. Users are also expected to be in the position to identify and evaluate this information in order to satisfy their information needs. However, they do not always have the time or skill to search the Internet for information that could support their work. So how may they be helped in these circumstances? One possible solution is the Subject Based Information Gateways (SBIGs)

Subject gateways work on the same principle – they employ subject experts and information professionals to select, classify and catalogue Internet resources to aid search and retrieval for the users Users are offered access to a database of Internet resource descriptions, which they can search by keyword or browse by subject area. They can do this in the knowledge that they are looking at a quality-controlled collection of resources [1]

An example of Subject Based Information Gateways is the Art, Design, Architecture and Media Information Gateway, which was introduced in 1996 [2]. It aims to help people to find Internet based information resources in subject areas related to art and design including fine and applied arts, architecture, media and museum studies and conservation. End-users are able to search the ADAM catalogue in a variety of search or browse strategies using simple or advanced techniques. (Figure 1 provides a screen dump of the home page). Training and support are also provided so that people use the service to its full potential. The records in the catalogue are created by a team of professional librarians, who locate resources according to the ADAM Collections Policy [3], evaluate the quality of resources against the ADAM Selection Guidelines [4] and then use the traditional librarianship skills, such as cataloguing and classification, to create a detailed description of the Internet resource.

Figure 1 *ADAM Home Page – (http //www adam.ac uk)*



The gateway to art, design, architecture & media information on the Internet

ADAM, the Art, Design, Architecture & Media Information Gateway, is a searchable catalogue of 2546 Internet resources that have been carefully selected and catalogued by professional librarians for the benefit of the UK Higher Education community.

To search the catalogue, simply type one or more search terms in the box above and click the 'Go!' button. Alternatively, try the advanced features in Search and Browse If you are looking for information about ADAM, you can use the site map to help you find your way around our web site.

Aims and objectives

This article provides the results of an evaluation of the use of the ADAM Gateway. The evaluation was conducted on behalf of the Surrey Institute of Art and Design based in Surrey, which hosts ADAM. Traditionally, use of an information system or service, such as a library, has been measured in various ways, including calculating the number of visits to the library. The number of users has been seen as an indicator of the success or failure of a library – the greater the number of end-users the greater the success of the library. In a similar way, the success or otherwise of an online information system can be measured by the number of end-users having accessed it. However, pure numbers fail to tell the whole story. Thus, this article examines not only the use of an online information service (ADAM) by calculating the number of users and establishing their identity regarding their age, gender, and occupation, but also provides some idea of their satisfaction with the service.

The study largely focuses on academic and research staff and students, although a number of librarians also filled in the questionnaires. The data provided on the use of ADAM should prove invaluable data for the designers of electronic, digital, or virtual libraries Their goal, of course, is not merely 'to get users to agree' with an online information system but to create a service which is usable and friendly, and one where end-users have been involved in its design [5] The satisfaction of user needs is the ultimate, and only, justification for the existence of any information service [6, p. 40].

Literature review

A comprehensive scan of the literature, surprisingly, discloses that there has been very little published on the use of online subject gateways. Yet there has been an increase in their number – and popularity – during the last five years, focusing on different subject areas, such as social sciences or art and design [7]. Log analysis of various online gateways can verify the rise in their use. This, together with the fact that online resources have become a major source of information for many people, has emphasised the need to know more about what people think about finding information on their own through online gateways.

Results of previous user studies have indicated that, although the use of online gateways can be irregular and light, the concept of providing users with access to quality Internet resources is generally welcomed [8, 9, p. 224]. It is plain also that many people seem to experience problems in obtaining information from the Internet [8, 9, pp. 222-224; 10]. These problems vary from the quality of information on the Net and lack of time required for searching, to technical issues such as how long it takes for a page to be downloaded Comments confirm that end-users require information systems that provide them with quick and direct access to information in a specific subject area:

> RUDI is the first comprehensive, detailed informative base concerning urban design that I have found on the Net. It is a mine of useful information, especially for those like me who are undertaking extensive research into a university final year project. It would be an awful shame to lose it [11].

> I am very impressed with BUBL's information provided to the Internet community [12].

Findings from previous user studies on how information is obtained from online information systems, such as electronic journals, have indicated that people are well favoured to the general concept of electronic information resources [13, p. 133]. Characteristics such as speed of searching and printing, the benefits of simultaneous access, and the fact that users can work from home having 24-hour access to resources are some of the main reasons why users enjoy using electronic resources [14, 15] However, users typically adopt a relatively unsophisticated, simplistic approach to searching: where browse facilities are used more infrequently than search and where single keywords are used instead of Boolean operators [8, 9, pp. 227-229; 16, 17]. Notwithstanding the low use of advanced searching techniques, such as thesauri, few people use the online help function, which could support their searches – despite the fact that users say they view the online help function as a useful option. [9, p. 230]. As a solution to the limited search skills of users, training and support is suggested by a number of surveys [8, 9, p. 231; 16].

End-users have expressed some doubts relating to digital information sources. The slow loading of web pages [15] and accessibility of electronic resources are some indicators of users' concerns. Users want fast and easy access to information without being required to memorise usernames and passwords in order to use an online information system [13, p. 75; 18] Ideally, users would like to get the full text of all electronic documents they locate. They do not like searching an electronic resource to find a bibliographic reference and then having to use another source to locate the full text of this item [19].

ADAM use

Developed in 1996 the ADAM Gateway is funded by JISC Since its inception there has been a rising demand for ADAM's services, although use is plainly seasonal (Figure 2) Peaks coincide with the beginning and end of the university spring and autumn terms. The highest number of accesses per month – 59,098 – was recorded in May 1999. Figures for 2000 indicate that use might well have peaked. Hourly access to ADAM is presented in Figure 3. The 24-hour nature of use is evident. The typical Internet lunchtime surge in use is there for all to see, although use actually peaks in the early afternoon As use has increased over the years the peak is becoming more pronounced. Subdomain analysis of daily access to ADAM reveals that during the five-year existence of ADAM the user population has fundamentally changed in character (Figure 4). As might be expected educational subdomains, such as edu and ac uk, have always represented the largest user group. However, there has been a constant decline in their representation: in 1996 edu and ac.uk

Figure 2. *Number of accesses to ADAM from February 1996 to June 2000*

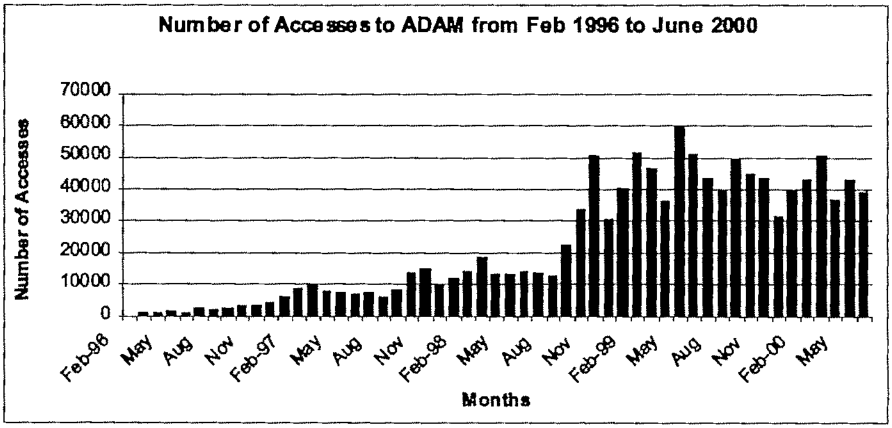


Figure 3 *Hourly access to ADAM*

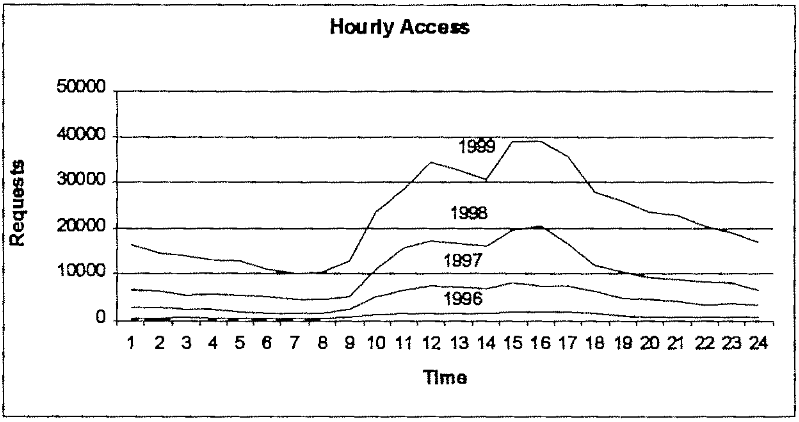


Figure 4 *Educational use of ADAM (1996-1999)*

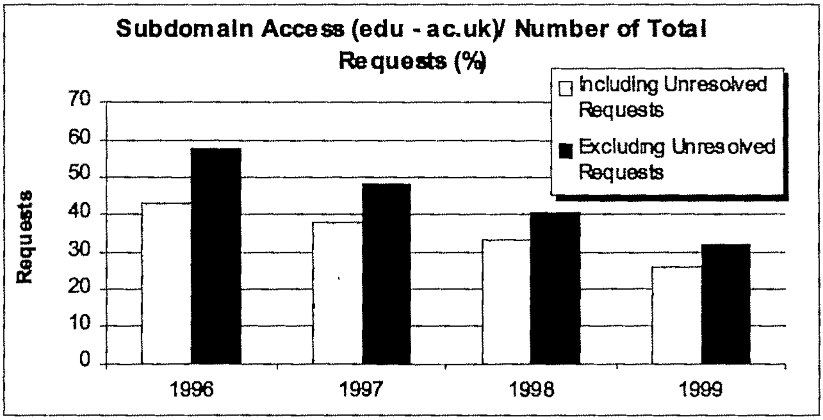


Figure 5 *British educational users of ADAM (1996-1999)*

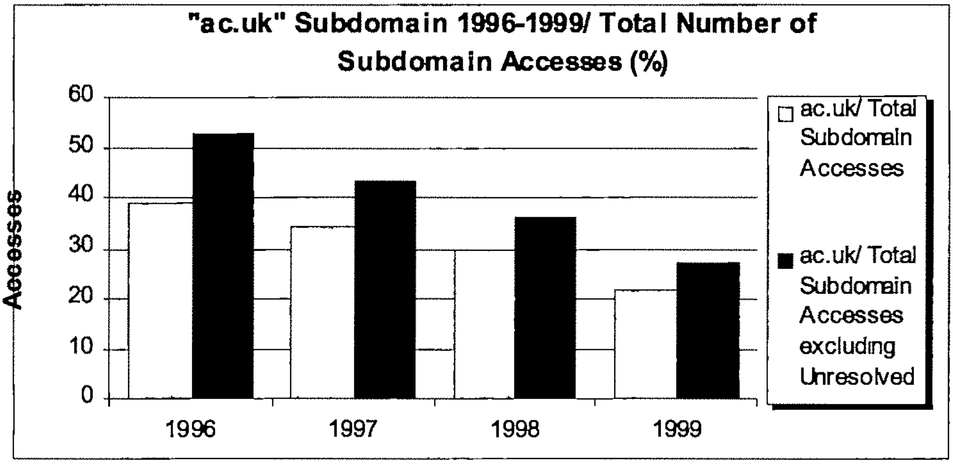
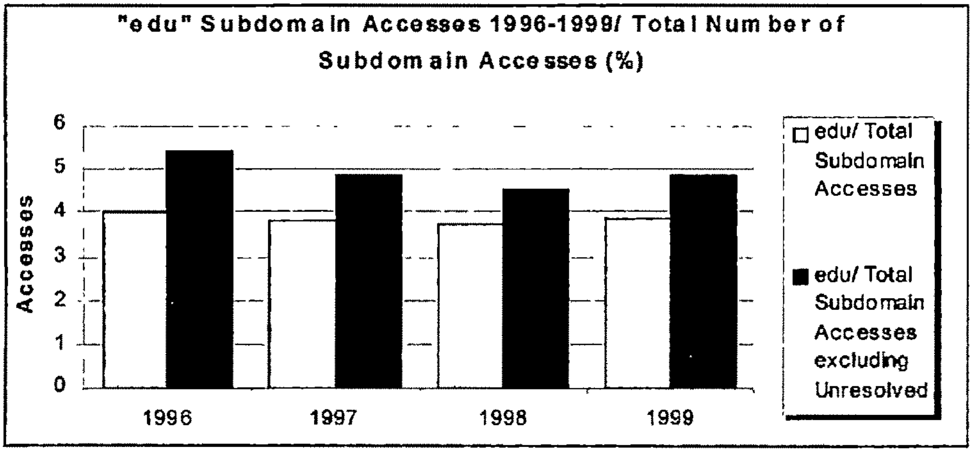


Figure 6. *Educational users of ADAM (1996-1999)*



accounted for 43% of total subdomain accesses, 58% if we discount the unresolved accesses, while in 1999 edu and ac.uk were 26%, and 32% excluding the unresolved accesses The reason for this is that the significance of UK educational establishments as users is declining. In 1996 ac.uk was 39% of total subdomain accesses and in 1999 it was 22% (Figures 5 and 6).

Web statistics are notoriously difficult to interpret [20] and many commentators have emphasised the need to obtain feedback from real end-users. A 1996 survey [10] of ADAM use was wholly focused on users' experience with electronic information. The aim of the survey was to gather information about potential end-users and their information needs and behaviour in relation to the use of existing resources The survey, which was targeted primarily at UK residents, identified three user groups as constituting ADAM's key audience:

1. teaching and research staff – students – librarians;
2. museum curators,
3. practitioners

The questionnaire, which was distributed in three formats – print, email attachment and online via the WWW was divided into five sections entitled: user background, information uses and retrieval processes, future developments, experience and use of computers, and Internet search tools and useful sites, respectively. Seven hundred and ten respondents answered the questionnaire, of which 30% were academic and research staff, (a disappointing) 7% were students, 26% were librarians, 7% museum curators and 15% were practitioners. There was also the 'other' option, which accounted for 15% of the respondents. Results indicated that the vast majority of respondents were regular Internet users: 36% indicated they used the Internet daily, 16% weekly, 2% monthly, 9% spasmodically, 4% rarely, and 33% either said they did not use the Internet or did not answer this question. Despite high volumes of use, 78% of the respondents encountered difficulty in obtaining information from the Internet. The fact that it is difficult to locate material relevant to their needs was the most frequent problem. They also raised doubts concerning the availability of information, speed, cost and gaining access to information. Two-thirds of the respondents accessed the Internet at work using their own or a shared machine. What is interesting about the Internet is that high volumes of use are achieved despite the not inconsiderable obstacles placed in the way of its use.

Regarding their search methods, the 'subject' option was their first choice, while 'author' and 'keyword' options were second. Of the respondents 41% indicated that they used thesauri as an aid to information searching. Librarians were the occupation group with the highest percentage of use, while practitioners were the lowest users. Thirty-eight per cent of respondents mentioned that they asked another person to carry out the search for them The group who reported the greatest use of delegation was practitioners, with students – the lowest rung on the academic pecking order – reporting the lowest use at only 17%.

Research methods

The study is an evaluation based on users' experience with the ADAM service. It attempts to evaluate ADAM in terms of real searching behaviour obtained by users' feedback. User-oriented evaluation of information systems and services is often best served by using a case study methodology [6, p. 41]. An online questionnaire was the main data gathering medium. Given the geographical scatter and large size of the potential user population it was the logical method. The questionnaire, which was made available on the ADAM website for a period of two months from 1st May until 30th June 2000, was aimed only at academic end-users – research staff, teaching staff and students. The survey period coincided with the period of peak use. The questionnaire was divided into two sections; the first section entitled 'Personal Questions' was intended to obtain personal information on the user – their age, gender and occupation. The second part entitled 'ADAM Use' was meant to obtain information on reasons for and frequency of ADAM use, the search methods and services preferred, and users' opinions on various issues, such as the advantages and disadvantages of ADAM.

ADAM survey

Characteristics of sample population

Eighty-four SOSIG users responded to the survey, of which 60.7% were female and 39.3% male (Figure 7). Regarding respondents' occupation, 53.6% were undergraduate, postgraduate, or research students, 3.6% were research fellows or assistants, and 16.7% were lecturers, senior lecturers, professors, or heads of departments (Figure 8). Although the questionnaire invited only the academic community end-

Figure 7. *Gender of respondents (%)*

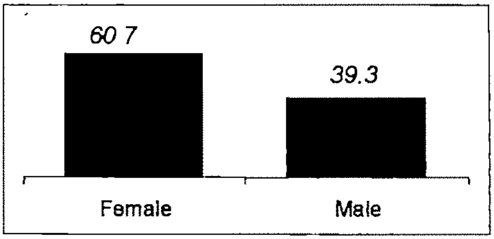


Figure 8. *Occupation of respondents (%)*

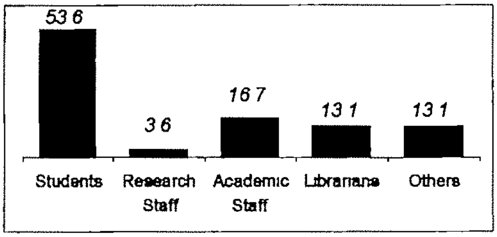
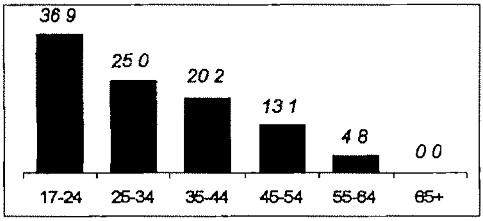


Figure 9 *Age of respondents (%)*



users to fill it in, some other groups completed it. The category 'others' includes occupations such as consultants.

ADAM appears to be used by all age ranges, although the majority (61.9%) were under 35 – a not surprising finding given the high proportion of students in the sample (Figure 9).

Frequency of ADAM use

A good deal of ADAM use is irregular and light. 21 5% of the respondents indicated that they accessed ADAM occasionally or hardly ever (Figure 10). Also ADAM appears to attract a lot of new users with well over a third (38.1%) of respondents saying this was their first time It is not clear whether this represents a large 'churn' rate for the service. If it does it might be a cause for concern and possibly explain the drop-off in use witnessed towards the end of the survey period. Less than 5% of respondents used the service on a daily basis. The daily users were a male librarian (45-54) and two male students (17-24 and 25-34). Despite the fact that the survey attracted many more women than men, men said they used the service more frequently than women did· 36.4% of men used the service on a daily, weekly or monthly basis. The comparable figure for women was 23 5%. Regarding respondents' occupation, librarians were the most regular users with 90.9% of them using ADAM on a daily, weekly or monthly basis (Figure 11).

Figure 10 *Frequency of use (%)*

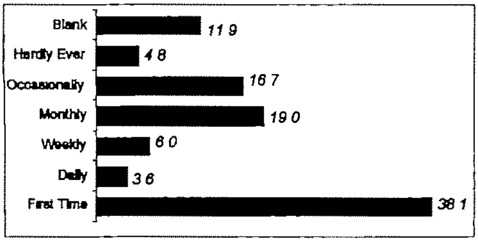
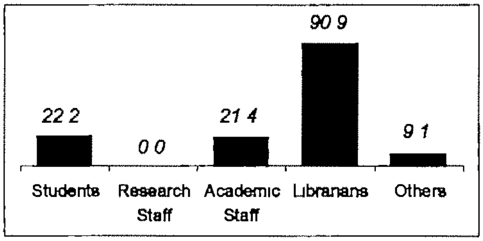


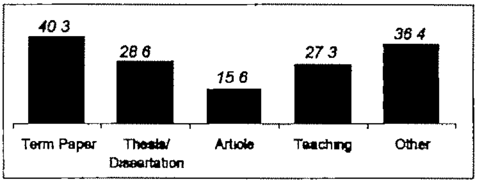
Figure 11 *Frequent users (daily, weekly and monthly) by occupation (%)*



Reasons for using ADAM

Academics use ADAM for a variety of reasons. The options provided by the questionnaire were limited because of the nature of the target group: writing up a term paper/project or a thesis/dissertation, writing up a paper for publication, e.g. journal article or conference/workshop paper, and supporting a lecture. There was also the 'other' option where respondents could indicate any other reason for using ADAM. This question was answered by 77 users. 68.9% of them said that writing up a term paper or a thesis was their main reason

Figure 12 *Reasons for using ADAM (%)*



Note respondents were permitted multiple answers for using the service, 15.6% used it for writing up a paper for publication, 27.3% for teaching, and 8.4% did not answer this question (Figure 12). Plainly ADAM is used largely in a bibliographic context. The reasons for ADAM use by occupational groups are presented in Table 1. The fact that librarians and 'others' occupational groups are included in respondents partly accounts for the high amount of people who specified another reason for using the ADAM service. Librarians indicated that they used ADAM for answering queries for their customers, such as students or creating catalogues, for instance compilations of web directories for use by students and staff in institutes of art, design and technology The 'others' occupational group specified either that they searched ADAM for personal interests or for supporting other people's work.

Place of use

For the purposes of the survey we attempted to establish the location from where respondents conducted ADAM searches. More than 38% of respondents gained access to ADAM from the university, 21.4% from home, and 25% from both the university and home (Figure 13) There was also an 'other' option where respondents could indicate other places of access. The library and the office were the main other locations provided by respondents who belong to librarians and 'others' occupational groups, respectively. Proportionally more women access the service from the university – 41.2% compared to 33.3% for men. Regarding occupational groups, students are most likely to search ADAM from the university and the 'others' group is most likely to search the service from home (Table 2)

Figure 13 *Location of use (%)*

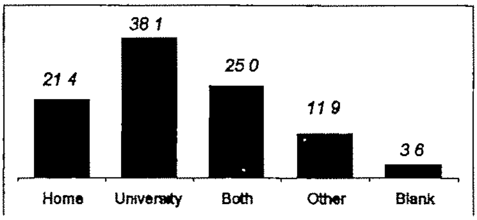


Table 1 *Reasons for using ADAM by occupation (%)*

	Students	Research Staff	Academic Staff	Librarians	Others
Term Paper	54.5	50.0	33.3	14.3	0.0
Thesis/ Dissertation	34.1	25.0	14.3	24.5	9.1
Article	6.8	0.0	33.3	28.6	27.3
Teaching	18.2	0.0	83.3	28.6	9.1
Other	25.0	25.0	25.0	57.1	81.8

Table 2 Accessibility by occupational groups (%)

	Students	Research Staff	Academic Staff	Librarians	Others
Home	20.0	0.0	21.4	9.1	45.5
University	48.9	33.3	21.4	45.5	9.1
Both	26.7	33.3	42.9	18.2	0.0
Other	2.2	33.3	14.3	18.2	36.4
Blank	2.2	0.0	0.0	9.1	9.1

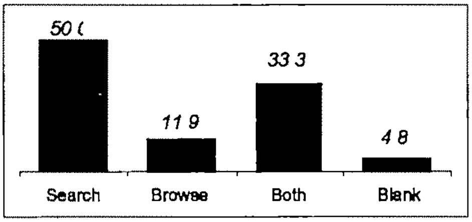
Evaluation of specific ADAM services

ADAM provides its users with a number of services to support their searching including online help, browse and search facilities. Users were asked to indicate which services they have used and specify whether they preferred browse or search, or both facilities. Searching the catalogue is a valuable retrieval method when users know what they are looking for – a specific resource or information on a specific subject area. Browsing offers users the chance to find all the available resources under a particular subject area, or relating to a particular geographical region. Online help aims to provide support to end-users on how to search the ADAM catalogue. Users who have not used the online help function were invited to indicate their reasons for non-use.

Search or browse

The most popular search method was direct searching – 50% of respondents preferred this method (Figure 14). If we discount the blank responses this figure rises to 52.4%. Browsing was preferred by 11.9% of respondents: 12.5% if we exclude the blanks. Whilst 33.3% of respondents preferred to use both search methods: 34.9% if we exclude the blanks

Figure 14. *Search or browsing preference (%)*



Women and men showed a similar preference for searching, respectively, 49% and 51.5% of them said they preferred searching. Respondents belonging to the age group 35-44 had the strongest preference for direct searching (58.8% preferred this method). In contrast those aged between 55-64 were the biggest browsers. Users belonging to the age groups 25-34 and 45-54 showed a strong preference for using both search methods, with users aged 25-34 favouring the dual approach most (Table 3). Regarding occupational groups, librarians were the biggest direct searchers (54.5% preferred this method), and the biggest browsers (18.2% preferred this method). Research staff were the biggest users of both methods (66.7% preferred this method) (Table 4).

Table 3 *Search or browse by age (%)*

	17-24	25-34	35-44	45-54	55-64
Search	58.1	38 1	58 8	36 4	50.0
Browse	16 1	9 5	0.0	9 1	50 0
Both	16 1	52 4	41 2	45.5	0 0
Blank	9 7	0.0	0 0	9.1	0 0

Table 4. *Search or browse by occupation (%)*

	Students	Research Staff	Academic Staff	Librarians	Others
Search	51.1	33 3	50 0	54 5	45 5
Browse	13.3	0 0	14 3	18 2	0 0
Both	28.9	66.7	28.6	27 3	54.5
Blank	6.7	0.0	7 1	0 0	0.0

Users' comments regarding their preference for the searching method indicated that its attraction lay in the fact that it was a simple, direct, quick and efficient method of retrieving information.

> It is a lot more efficient and easier [way] to locate specific information.
>
> Helps students locate specific information.

In contrast, those arguing for browsing said it allowed them to do the equivalent of a 'shelf search' and to identify resources in a specific area. They explained:

> [It] enables me to search through related topics [that] I had perhaps not thought of.
>
> [It] can sometimes point you in the right direction

In addition users who had shown a preference for using both search methods, commented.

> Different queries require different access techniques.
>
> Depends what I need to look for.
>
> Sometimes I know exactly what I am looking for (search), and sometimes I don't (browse).

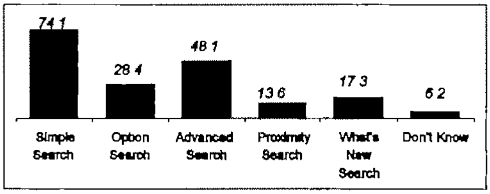
To obtain more details on the searching method employed users were asked to specify which search or browse strategies provided by ADAM they used. Users are able to choose among five search strategies and three browse strategies. The search strategies provided are:

- the simple search;
- the option search (where users can search within specific fields, such as title or keywords);
- the advanced search (where users can search for combinations of search terms or parts of terms),
- the proximity search (where users can specify how close their terms must be to each other);
- the what's new search (where users can view the records in order of date added to the database, with the most recently added displayed first).

The browse strategies provided are:

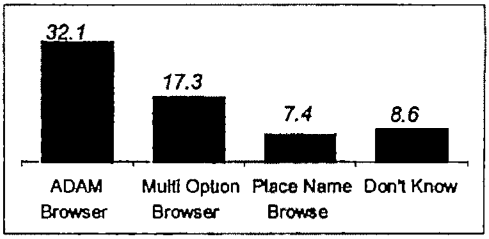
- the ADAM browser (where users can browse the database by subject headings);
- the multi option browser (where users can browse the database by any combination of the following – historical period, resource type, subject headings and the Art and Architecture Thesaurus);
- the place name browser (where users can browse the database by geographical area, based on the Thesaurus of Geographic Names).

Figure 15 *Search strategies used (%)*



Note. respondents were permitted multiple answers

Figure 16 *Browse strategies used (%)*



Note respondents were permitted multiple answers

While all the search and browse strategies have their adherents there are plainly some favourites Eighty-one people answered this question The search strategy most favoured was 'simple', 74.1% of respondents mentioned it (Figure 15), while 'ADAM browser' was the browse strategy with the highest proportion of use – 32.1% of respondents mentioned it (Figure 16). Regarding occupation, all groups showed a preference for simple searching with, perhaps surprisingly, research staff and the 'others' category being the biggest users. All age groups preferred the simple search, with users aged 25-34 being the biggest adherents (90% preferred this method). Students, academic staff, librarians and the 'others' category preferred the 'ADAM browser' strategy, with 'others' having the highest proportion of use (54.5% preferred this method). Of the browse strategies all age groups preferred the 'ADAM browser' except for users aged 55-64, who favoured the 'multi option' browse strategy. The biggest users of the 'ADAM browser' were those aged 45-54 (45.5% preferred this method).

Online help

Only 19% of respondents had called on online help (Figure 17). Men appeared to need more help than women – 27.3% of men asked for online help but only 13.7% of women. The online help function seemed to have been used by all the occupational groups, but (intriguingly) mostly by research staff (66.7% used the facility). Of course the use of the help command can be as much a function of the difficulty of the search as the ignorance of the user. All age groups made use of the help facility, although users aged 45-54 were the biggest users (27.3%). Figure 18 relates Respondents who had not called on online help were invited to indicate the reasons for non-use: 35.3% of the respondents specified that they had not felt the need for help yet, while 30.9% of the respondents implied that they did not know that online help was available (Figure 19). The latter finding is particularly significant for the ADAM designers.

Figure 17 *Online help use (%)*

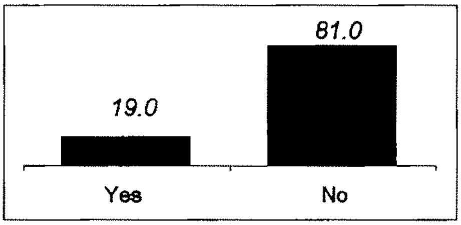
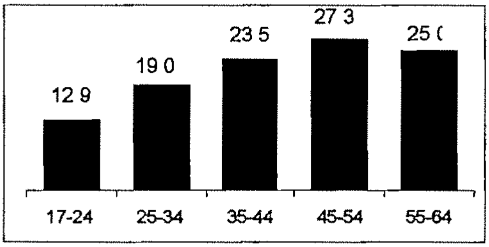


Figure 18 *Online help use by age (%)*



In addition, people were asked to give their opinion as to whether they believed that the online help function could replace the help provided by an intermediary, such as a librarian. Significantly – and perhaps a little worryingly, 51.2% of the respondents implied that the online help service can play the role of a human supporter, while 44.0% of the respondents had the opposite opinion, and 4.8% of the respondents did not answer this question. Despite the high proportion of respondents who indicated that the online help can replace a human supporter, 18.6% of them had used the online help and, surprisingly, only 2.3% specified that they would prefer to ask a person to support them (Figure 20).

Supporters of the human intermediary provided the following reasons:

- Easier to explain to a librarian (from a student).
- I think the online help is really important,

Figure 19. *Reasons for non-use of the help facility (%)*

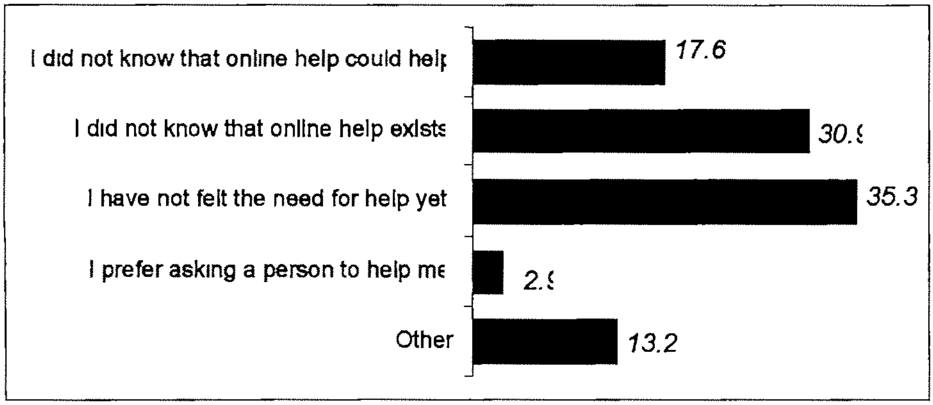
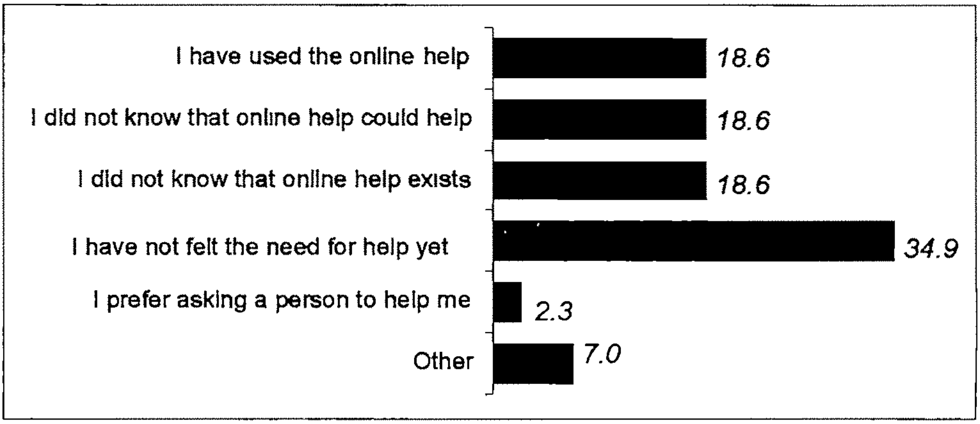


Figure 20 *Online help use and non-use by supporters of the idea that 'online help can replace human help' (%)*



but I find a lot of value in a librarian (student).

- A computer cannot understand you as well as another human – interpolation of information is better than entering multiple search terms as a person can point you in directions that you have not thought of before (student).
- A librarian can advise and help to analyse and evaluate questions and results on an individual basis – generic online help is only adequate for basic searching information (researcher).

Advantages and disadvantages of using the ADAM service

Respondents were called on to comment on whether there were any advantages or disadvantages to using ADAM over a traditional library or not Plainly this was an important question. More than two-thirds (63.1%) thought there was an advantage Most users cited more than one advantage and many overlapped. The most cited advantages were:

- Speed, access to a wider source of information
- 24-hour access to information.
- Easy access from home.
- Quicker more comprehensive and up-to-date [information].

Interestingly the stress is almost wholly on access and speed of delivery, content and quality not being mentioned.

There were strong supporters of traditional libraries (34 5%) who raised doubts concerning the cost of online services, the time spent in front of computers, and the fact that few (full text) resources are available in electronic format. Other concerns were lack of human support and familiarity with PC and network problems. The following comments are illustrative:

- Online services will never replace the usefulness of hard copy.
- It costs when I access it [ADAM] from home.
- Sometimes you can get more additional information in a library that would not necessarily be shown when using ADAM.
- Does not get you out of the house.

Regarding occupation, all groups saw both advantages and disadvantages of the ADAM service over a traditional library. However, the 'others' category was the group of respondents with the highest percentage admitting that ADAM had advantages over a traditional library (81.8%) and research staff proving to be the group who saw more disadvantages in digital services like ADAM (66.7%). Respondents aged 55 to 64 – defying their stereotype – were the age group who saw the greatest advantages in digital services (75.0% said so). On the other hand, those aged 45 to 54 represented the group of respondents who saw the greatest disadvantages (72.7%).

Viewing ADAM

Finally we were interested to discover how ADAM was viewed conceptually. We all know what a library is, looks like etc., but what do people perceive of an electronic service like ADAM? To this end we provided respondents with one possible definition and asked them whether they agreed with this. The definition was:

> A library based on the Internet that provides you with a collection of information, which is organised, digitised, and specialised in a specific subject area

More than three-quarters (76.2%) agreed wholly with this largely uncontroversial definition, 19% had some affinity with it and 1.2% disagreed with it (3.6% failed to provide an answer). Plainly users were led somewhat by the definition provided, but even making an allowance for this there is still a large consensus. Doubts about the use of the word 'library' figured most strongly in the comments of those who were not completely signed up to the definition. A few respondents said that, because they had not used the ADAM service extensively, they were not in the position to define it More men (81 8%) seemed to accept the definition provided than women did (72.5%). Regarding occupational and age groups, students and those aged between 55 to 64 were those that showed the highest levels of agreement – 82.2% and 100% respectively.

Conclusions

The proliferation of information on the Net and the clear need for organised and subject specialised information supports the use of online gateways. Results of previous user studies have indicated that the concept of online gateways providing users with access to quality Internet resources is generally welcomed. At the same time, the 24-hour, direct and speedy access to information and the fact that users are able to obtain information without leaving their desktop are some of the advantages of gateways. In fact, when users were asked to indicate whether they would use ADAM again or not on a scale of 1 to 4, where 1 is unlikely and 4 is likely, 82.1% of the respondents marked either 3 or 4.

Notwithstanding the advantages in using a gateway, there were people who saw some disadvantages in their existence. These people were largely worried about the cost of the digital services, the time spent in front of computers and the fact that few information resources are available in electronic formats. There were other worries: lack of familiarity with computers, together with the lack of human support and training. These problems probably explain why ADAM use is light and irregular. Few people used it on a daily, weekly, or monthly basis and amongst those who used it most were information professionals – always a group ready to exploit an end-user based service.

Our results largely confirm previous surveys on the use of online information systems. First of all, users take a simplistic approach to searching and search strategies are used more frequently than browsing ones. Secondly, few people use the online help function to assist in their searches When users were asked to indicate their reasons for non-use a great percentage of respondents specified that they had not felt the need for help yet, while others mentioned that they did not know that online help existed as a service This verifies what previous studies have disclosed that users are not always using information systems to their full potential. A preference for human support and training was shown by only a small percentage of respondents. Although when end-users were asked to indicate their opinion on whether they believed or not that the online help function can replace the help provided by a human being, almost half of the respondents gave a negative response. However, it is plain where the digital wind is blowing. Self-help and speed of delivery are clearly priorities for today's users.

Finally, there is some evidence to suggest that the gateway concept, as presented by ADAM, might have run out of steam and that some fresh thinking about what today's information 'players' require from a digital information service is called for. Getting closer to the 'player' is plainly a first step in the revaluation. Such services as ADAM rub shoulders with the likes of Amazon.com, VirginNet and Guardian Unlimited, and comparisons are inevitably going to be made and good practice needs to be constantly taken on-board.

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New information perspectives

Comment
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Comment

Change and the changing face of a regional newspaper library 1990–2000

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This paper arises from the work that the author has done during the past year in preparing for a series of lectures on the analysis of the factors that have influenced the development of the Library of an English regional morning newspaper over the last decade. He has given these lectures to students at various Schools of Information Studies in the UK. It is all about the scale and speed of change in one particular sector of the library market, but there are lessons (and surprises) here for everyone. The interpretation of the changes is purely the author's, and is not based on a rigorous analysis using management or information science theories. Rather, the commentary should be read as a reflection upon events and an attempt to look into the future for one relatively small corporate information unit.

1990s

The start of the nineties saw the Library in fine 'professional' shape. The staff worked in an information-friendly environment at a time when technology was opening up opportunities for pro-active information management, and the journalistic users were keen to have new ways of extracting information from secondary sources opened up to them. The Library was part of the Editorial function of the newspaper It was staffed by a team of six professional librarians, whose jobs were focussed upon serving the needs of their journalistic colleagues through the creation of a series of identifiable 'information products' The Library was staffed for 16 hours per day Monday to Friday and 8 hours on Sunday to match the working patterns of these users, whilst the newly-installed full-text database was available to the users 24 hours a day, 7 days a week. Pictures were still being filed in hard-copy but it seemed as if the technology would soon be available to store them digitally.

The full text database of articles was enhanced with subject keywords and full picture details where appropriate. This database was available to the journalists on stand-alone terminals, but was usually accessed on their behalf by the Library staff. In addition, a professional librarian worked as an Information Researcher with a remit of exploiting the newly available commercial databases of information.

The text of the newspaper was to go onto CD-ROM, and another professional member of the Library team was given the task of not only promoting the CD-ROM but also of explaining the whole concept of CD-ROMs to potential users within the circulation area of the newspaper.

2000

Moving on ten years, the newspaper no longer has a Library as such. Instead, its information needs are served by an archive of the pre-electronic story cuttings and pictures, the database of text and pictures, and an Information Researcher who has the sole responsibility for supporting the work of the journalists.

Of the six professional posts, only the post of Information Researcher remains, though the work of the other five posts continues in different guises. The manager of the Library now looks after the Internet activity of the Company; the two librarians responsible for text and picture indexing and cataloguing have been replaced by three part-time non-professional staff (two of whom work for an outside company); whilst the two librarians who, among other tasks, were responsible for the creation of printed information guides have been replaced by a full-time Database Editor who is not a professional librarian.

The electronic archive is now available on the PC desktops of the journalists, and is accessed using the same browser as is used to access the Internet Some use of commercial information databases continues, but most information research is based upon the free sources available on the World Wide Web.

Factors influencing change: technology

In 1990, the Library was at the forefront of technological change as it exploited the power of full-text search software and the newly-emerging CD-ROM technology to make newspaper stories accessible in new ways for new markets. However, the company behind the full-text search software failed to find a market in UK regional newspapers for its product. This lack of a user base, along with changes in ownership, led to the company being unable to develop its products for the newspaper market. Although a third party systems integrator took on some aspects of the development of the archive required by the Library, it too found that a market for the enhanced product in the UK was not to be found.

Although the original full-text archive with a semi-developed picture archive continued in use until the eve of the Millennium, its role was gradually supplanted by a new archive which absorbed the contents of the original archive so that it could take over completely in the year 2000.

The differences between the two archives are indicative of the changes that have taken place in computer technology over the recent years. The original archive used a custom-built front-end which was available only on licenced PCs The new archive uses a browser interface that can be used on any PC or Mac connected to the company's network. The old archive ran on a heavy-duty UNIX box; the new archive runs on an NT server. The old archive had a powerful search engine but was cumbersome in both record creation and retrieval. The new archive has a less powerful search engine but simple record creation and retrieval functions.

Looking back, it is easy to highlight investment and development decisions that were 'wrong'. However, at the time, it appeared that the Library was continuing to develop a successful product within the limited resources, financial and staffing, that were available. Now it appears that the developments to track are those which will extract information automatically from one source (in our case, the printed newspaper page) and re-purpose it for use by various electronic storage and dissemination systems (such as email alert databases).

Factors influencing change: the company

In 1990, the Library served a newspaper that used information in an active way as one of the selling points of the title. Indeed, two professional librarians were employed to create information guides to the region which were seen as bringing added reader value to the newspaper as well as advertising revenue

On a day-to-day basis, the newly available database sources from companies such as FT Profile and InfoCheck seem to offer a rich seam of information to be mined by professional library staff on behalf of their journalistic colleagues. Likewise, the use of the internal archive seems to repay the professional attention that was deemed necessary to create a true record of the newspaper's stories and pictures.

Over the intervening years, the usefulness of information as a selling point for the newspaper has declined and the cost of creating the various information products has increased. As the company passed through various stages of ownership, all aspects of its business were scrutinised. Not surprisingly, the costs of the Library Service came in for particular attention as no direct revenue could be matched against them. Gradually, functions of the Library were scaled down or transferred, and the professional staff not replaced as they left. At the same time, outsourcing of the creation of the internal full-text archive became an option which gave the company flexibility in costs whilst retaining the core product, albeit in a changed structure.

Factors influencing change: the information environment

In 1990, information was a commercial product that was expensive to create, process, and extract. Though changing technology was opening up new commercial opportunities, the take-up of new information products such as CD-ROMs was slow and restricted largely to other professional users of information. However, it did look at one time as if even an English regional newspaper could make money from its content by selling it onto other information sources, in particular commercial database hosts. Alas, the revenue stream so established failed to become significant and certainly did not cover the costs of the database creation and maintenance

Although the Library benefited from access to these commercial databases, the cost of such access remained high and the ease of use limited In addition, although these databases gave a national and international dimension to information research not available before, they failed to help with the core regional and local enquiries which made up the bulk of the Library staff's work.

Over the past two years the Internet has subverted the information business. Previously expensive databases have dropped in price because of the availability of 'free' versions of their core information sources on the World Wide Web, and the standard client browser interface has allowed all users to believe that they are 'expert' users. In such an environment, what is the role for a professional librarian in an English regional newspaper?

Conclusion

In retrospect, it was fortunate that a number of factors came together in the late eighties/early nineties, which led to the significant professional staffing of the Library. Those factors no longer exist.

There is still a role for a professional information worker in an English regional newspaper, but it is as facilitator, trainer, and desk researcher rather than archive creator and maintainer. Indeed, the technology behind the Internet has created intranets that are prime tools for exploitation by the pro-active information worker, not least because the result of the work is available on every desktop in the company.

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Location, location, location

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This article explores the belief held by one publishing company, UpMyStreet, that location-based searching technology not only allows users to more easily access information about their local area but also, when manipulated intelligently, can help revive our lost sense of community.

Introduction

One of the true 'killer applications' on the Internet has been the development of location-based searching using geo-coding technology. However, the real potential of location-based searching has not yet been fully tapped Attaching precise grid reference locations to data often changes the nature of the data, raising new opportunities and challenges. At UpMyStreet, it is a firmly held belief that the intelligent juxtaposition of data and location provides the opportunity to offer people something we have lost in the 21st Century – a sense of community.

So why is location-based searching so powerful? On the Internet it has really come into its own in the last few years. There has been a dawning realisation that this is personalisation at its best. There have been many attempts at producing good personalised Internet services, ranging from intelligent agents to collaborative filtering. Perhaps the solution does not lie with neural networks, but with the humble postcode – what could be more personal to people than the area where they live or work?

The first location-based services on the Internet were developed for cinema listings and directory-type services, pioneered by companies like Scoot. Whilst popular, there was always a question of how convenient the service was when you really needed it: it was often easier to pick up the *Yellow Pages* to find a local pizza delivery company, rather than going to the trouble of switching on your PC and going online This all changed once you were able to access the same service from your mobile phone with the breakthrough of WAP technology. The imminent arrival of GPS-enabled phones will fast-track take-up of these services even more, paving the way for the phone which knows where you are, knows where you want to go and gives you the driving/walking instructions on how to get there – a great step forward in the delivery of accurate and timely information Unfortunately the current offering of WAP services leaves much to be desired. Both critics and users rightly argue that the market is full of 'hype'. This is because, given the current state of the technology, it is difficult to deliver a service that is both useful and usable.

UpMyStreet

UpMyStreet is a multi-platform local information service It is a location-based service in the purest sense. The home page is a straightforward call-to-action gateway: users are invited to submit their postcode or town name and are then presented with an overview of local information and facilities for their selected area. This information ranges from datasets such as property prices, school league tables and council performance indicators to 'FindMyNearest...', a directory of local services such as plumbers and 24-hour chemists. New datasets must in some way be location-dependent – ideally to postcode level, but as a minimum to regional level.

The website, upmystreet.com, was created by a digital media consultancy, Aztec Internet, in October 1998. It was originally conceived as a marketing demo site, designed to illustrate how the potential of the Internet could be harnessed through a powerful combination of location-based searching, strong usability design and smart database structuring.

Users very much liked the concept. The prominence of property price information (provided by the Land Registry) and other information such as council tax bands and local crime figures meant that the service was used as a decision-making tool by potential house-buyers. An endless stream of dotcoms has subsequently attempted to tap into this lucrative market. Many, such as asserta home, have collated estate agent house details into a database, allowing users to search across this database by postcode. UpMyStreet sees the potential of location-based searching as much more wider-reaching than all this.

One of the objectives of the site is to broaden awareness of how much of what people need is actually available on their doorstep, thereby hopefully re-creating some of the sense of 'true' community, which has been lost in recent years. This is more than just a call to 'buy local': UpMyStreet would like to increase visibility of all local facilities – from local sports clubs to GP surgeries. The customised location functionality we deploy means that we can, with pinpoint accuracy, direct users to their nearest facilities – down to a matter of 50 yards if necessary. One could suggest that users would probably know what facilities are 50 yards away, but users often do not. 'Convenient' in the 21st Century is rarely synonymous with 'close' – it rather conjures up images of out-of-town shopping malls, e-commerce and interactive TV.

This 'doorstep' feel to the site can be seen in evidence in UpMyStreet's classified advertisements service. Items for sale is a 'small advertisements' section of the service, containing categories such as household goods, computers, leisure items. All items are sorted by distance from the selected postcode. This search facility also makes an excellent browse by-product. Users find it fascinating (and addictive) to keep checking what is for sale in their neighbourhood. You may have been in need of a new garden shed for years, but never done anything about it. Suddenly discovering by accident that there is one for sale less than 200 yards away probably means the difference between having one and not having one. There is also the question of whether adding location to the mix will actually increase the number of advertisements as potential sellers see that they can reach a more targeted audience

The combination of postcode and data on the site obviously then, in itself, helps create a 'local feel'. There was, nonetheless, a need to understand more about user behaviour in relation to locality issues. This would help ensure that the site architecture supported user needs· that relevant information could be accessed simply and quickly. Re-creating a sense of local community is not a task to be undertaken lightly. What constitutes local community? Do the concepts of 'local' and 'community' mean the same thing to all people? As many websites have learnt to their cost, community is not something that you can artificially create. How many sites have built large community areas, then watched and waited for the people to turn up? Geographic community is obviously not the same as what web-users generally think of as community: one of the great strengths of the Web has been its ability to draw like-minded people together across the globe. Geographic communities often have imaginary borders that only residents and estate agents are aware of. There are close-bordering areas within London, for example, which have drastically differing identities.

Some of these issues were explored in a recent round of usability testing. It appears that user awareness and interest in geographic community often depends on their stage of life and how settled they feel. For house-owners, local facts and figures and 'community' issues were incredibly important. For those renting a property, there was not often the same commitment to a 'street-level' idea of community.

How did users visualise their local area? Users thought of their area as comprising different levels – their street, town, region etc. It was important to them when searching that they could broaden out or narrow down their search when necessary. So what would a user's 'community' look like if plotted out on a town plan? UpMyStreet's 'FindMyNearest' service does literally find your nearest services, working out from a postcode in a concentric circle – but was this how people use facilities in their area? Nearest may not always be best, naturally, but also it may sometimes also not be the most convenient. The nearest cinema to you may only be one mile away, but getting there may involve you taking two buses, whereas the one three miles away may be just a few stops by tube. Convenience of a cinema may be dictated by the relative location of the friend you are planning to go to see a film with. The testing concluded that people go to different places to service their different needs.

UpMyStreet encourages people to enter postcodes rather than place names in order to get the best out of the service. Users do not naturally think about their local areas in terms of postcodes. In usability testing most users could only recall 1-3 postcodes. From our search logs, we already knew the normal searching pattern for new users: they look at their own postcode first, then their partner's, then that of their parents or children. Finally their curiosity really does get the better of them and they try to think of the best and worst postcode areas to live in. Users will now be provided with a postcode look-up service.

Did users understand what postcodes really represented? How many realised that the final two letters of their postcode only covers, on average, fourteen houses within their street? The service frequently receives complaints from users that their postcode has not been recognised. On many occasions this is because their postcode has in fact been changed by the Post Office, and they either did not know or had forgotten. Users felt that the postcode defined their street, but not their community.

Educating the user as to what postcodes mean is critical, as a further objective of the service is to raise people's awareness of how their lives are affected by the postcode they live in. Users have long known that the amount of car insurance they pay depends on their postcode. There is, however, a growing awareness that your postcode can affect the quality of your life in many more ways. This is referred to by the press as the 'postcode lottery'– users are becoming familiar with the idea that the length of time they wait for operations varies dramatically from postcode to postcode – worse than this, it can actually be a matter of life or death. This was highlighted yet again recently in the press with the case of the woman refused life-saving treatment for Hepatitis C, because Avon Health Authority could not afford the £4,300 to treat her. If she had lived five miles further south in the Somerset health area she would have been eligible for treatment.

UpMyStreet provides not only visibility of these performance statistics, but also highlights who exactly is accountable for the services in question. It is impossible to pinpoint accountability for local services unless you know which authority or body is responsible for them. Most users would not be able to say exactly which organisation is responsible for the bulk of local services. This is not surprising in that government, and especially local government, is very complex. There are five different types of local authority: County and District Councils, London Borough, Metropolitan Districts and Unitary Councils Many areas will be served by more than one council, with perhaps the county council providing most of the services such as education, and the district council providing such services as housing and leisure facilities. Some areas also have parish and town councils. Parish councils, for example, have played a role in planning application disputes To make matters more confusing, roles and responsibilities are under continuous change at local and national level. Until 1995 policing was the responsibility of County Councils, after this date the responsibility was transferred to Police Authorities. London's Metropolitan Police service, once under the control of the Home Secretary, is now the responsibility of Mayor Ken Livingstone.

UpMyStreet has simplified this for the user – they do not need to know who is responsible. How is this achieved? – with smart database structuring and the mapping of postcodes to boundaries such as local authority, county, constituency. If this data is not publicly available, we may even create the dataset ourselves – this was the case with police authority boundaries (information which the Police Authority did not even hold!)

Users may blame the council (and often do) for all sorts of problems that are not within their remit – the classic is blaming the council for the state of the roads, whereas it is in fact the responsibility of the Highways Agency In a recent round of usability testing, users were given the names of 100 local and national services written on individual cards: they were asked to sort these into categories that made the most sense to them. Users initially grouped together many of the cards under what they called 'council', i.e. according to the service provider responsible for that category Planning applications and rubbish collections were placed not under environment but 'council stuff'. Awareness that users perceive the world like this helps us understand how data should be structured on the site: in this case, it would be useful to provide a Council Index, which will list all services and link the user to the relevant subject area on the site.

It is part of UpMyStreet's mission to make it clear to people not only who is directly responsible, but allow (and encourage) them to act on this information if necessary by contacting the relevant body, at the same time educating them as to whom 'controls' the quality of life in their area. User testing demonstrated that users liked the combination of information and opportunity to act upon that information, e.g. contact details for their local council next to council performance indicators.

All this is very well, but of paramount importance is the 'trust factor'. The site has a responsibility to ensure that the data given is accurate and up-to-date. We also have the responsibility of ensuring that users understand what the data really means: people have problems with statistics at the best of times. It is one thing to give users an accurate portrayal of their neighbourhood, but doing this does require some sensitivity – it is where you live, and although many people may not go as far as feeling actual pride in their neighbourhood, most will certainly be quite defensive about it if it is misrepresented.

The most sensitive data on the site at the moment is probably the Acorn profiles – these originally were meant as a tool for marketers, to enable them to target relevant postcodes in their mailing campaigns. There are basically 52 postcode 'types', and one of these types is assigned to every postcode in the country. The data is very useful in identifying suitable areas when you are buying a home. They describe whether an area has a bohemian rather than suburban feel, for example. However, the data goes beyond this to details of food consumption and purchasing habits. There was feedback from users who were perturbed about the way in which their area was described Some users did not take kindly to being described as TV-watching, tomato-ketchup-and-chip-eating stereotypes. We also had users vociferously complaining that their profile stated that they were one-car owners (typically Ford Sierra), whereas they insisted that most houses in their road had at least two cars – and, moreover, one of them was a BMW! The point is that, similar to the postcode lottery issue, this is the way that your postcode dictates how you are perceived and dealt with by the rest of the world.

Damaged pride apart, users do have a real point Data needs to be presented in such a way that the user can easily interpret it and draw conclusions. If this sort of data is presented in the wrong way it could affect them in a more material way – a fall in the value of their house. UpMyStreet has gone to great pains to explain to users how this data is gathered and what it really means.

Conclusion

Location-based searching, therefore, has a great capacity to provide residents with a user-focused local information service, simply through the combining of postcode with relevant datasets. At the very least, the service should be a useful tool to help residents make decisions – whether that is where to find a good plumber or where to buy their next house. By taking this further though, and educating the user as to those factors which influence their lives, there is a good chance that users could use the service as a tool to begin to influence and re-shape some of these factors – in effect, re-shaping their community.

Gatekeepers and other intermediaries

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Ever since information technology was introduced into the work of some special libraries in the 1960s, there have been predictions that end-user searching of online databases would make librarians unnecessary. The enormous developments in automated information retrieval since then, and the coming of the Internet and the World Wide Web in the 1990s, have led to claims that a process of disintermediation is well advanced. To some commentators the special librarian is already becoming irrelevant However, if we use Thomas Allen's concept of the technological gatekeeper, identified in his seminal work of the 1960s, we obtain a clearer idea of the role of the intermediary. The gatekeeper is a member of the scientific and industrial research group who can be observed performing an informal information counselling function with colleagues It will be argued that this indicates a fundamental human preference for information mediated by human interaction, and this argument will be supported with illustrations from information behaviour in both the industrialised and the developing world The work of the librarian, although not identical with that of the gatekeeper, can be seen as drawing its strength from this basic preference Finally, it can be suggested that already a process of reintermediation is identifiable Librarians are identifying new roles and developing new competencies for the era of electronic information and, arguably, they are proving their worth in the information transfer process even more strongly than before.

Introduction

For decades now there has been a fear that the role of the librarian, the special librarian in particular, would disappear to be replaced by that of the information scientist. The challenge of the information scientists, represented by international bodies such as FID (the International Federation for Information and Documentation), or national professional associations such as the UK Institute of Information Scientists (IIS), has not developed in quite the way some have predicted. Librarians remain in demand, and they have changed and modernised their practices and attitudes, becoming more like information scientists in the process As a result, the membership of professional bodies for information scientists has never matched that of those for librarians. In the USA, the American Library Association (ALA), and the Special Libraries Association (SLA), are much larger than the American Society for Information Science (ASIS) In Britain, the IIS is about to merge its 2,500 members with the UK Library Association's 25,000 FID constantly struggles to keep up with IFLA, its more successful rival. Nowadays the threat to librarians comes not so much from a rival information profession as from information users who are thought not to need the help of a human intermediary.

A process of disintermediation [1] has been in operation since the 1960s, when end-user searching of online databases first became a significant phenomenon The rationale behind this was simple. As information became available at computer terminals linked by modems to remote databases, the importance of the library as a place where information was stored was diminished. The idea was that a search for information could as easily take place in a researcher's office as in a library, and could as easily be done by the researcher as by the librarian. This ignored the fact that in the 1960s and 70's much of what could be discovered from online databases was secondary (bibliographic) information about primary information (in the form of printed documents) Access to a library was still usually necessary if the primary information was to be seen and the help of a librarian was important in training the user, interpreting the information in the databases, and obtaining copies of the documents. Thus, although the end-user took a more central position in the information-finding process, the librarian was certainly not excluded from it. Indeed by developing OPACs to aid the user's access to library collections, librarians showed their confidence in technology as a complement to their professional role, rather than a replacement for it.

The threat originally seen in online databases has now re-emerged, much stronger than ever, first with easily searchable CD-ROMs that could be delivered direct to the end-user's desk. Then, more or less contemporaneously, came widespread availability of the Internet and, in particular, the World Wide Web (WWW) [2, 3]. Enormous information resources are available on open computers linked by the Internet and searchable hypertextually on the WWW. This offers the individual searcher direct access to text, graphics, moving images and sound in a way that is quite different from the hard to interpret and often disappointing clues to information content that were offered by the databases of the 1960s and 70s. Search engines and specialised portals provide assistance in accurate and effective searching, so that even children can locate and almost instantly call helpful information resources to their terminals from the remotest possible locations E-commerce and e-business are in the process of altering, and widely believed to be totally transforming, the whole aspect of professional work. At the same time, everyday life and leisure are undergoing similar processes for those who have Internet access. With increasing volumes of information exclusively published in electronic formats, and books obtainable very swiftly from Internet retailers like Amazon.com, the technology seems to offer the user complete independence from the librarian. Now the question is whether there is any role that the librarian can hope to play?

Intermediaries

What this paper will argue is that although the changes in process are profound, and are already affecting librarianship in major ways, there is no cause for despair. Librarians perform a function that could always be ignored by the skilful independent searcher after knowledge. In the past there have always been scientists and scholars who have known the bibliography of their subjects better than librarians and who were perfectly well acquainted with the publishers, specialist booksellers and collectors of books and other documents in their field. In theory, such people could have worked quite successfully without ever consulting a librarian or using a library. In practice, they have usually relished the way in which contact with librarians could further expand their knowledge, and have used libraries to complete their access to publications that they could not personally succeed in collecting. Maybe the modern equivalents of the great scholars of the past will use the WWW, and the successor technologies that will no doubt be developed, to make themselves totally independent of human help. Maybe, rather like their predecessors, they will not.

For the ordinary information seeker, however, the case is somewhat different. It can be argued that there are fundamental human preferences that will guide the ways in which people seek information, whatever the technological environment. Few people have the confidence that arises from the great scholar's mastery of a discipline and its literature. It is true that people gather some information directly and interpret it themselves. In this way a farmer can watch cloud development, feel temperature and moisture variation in the air, observe the behaviour of animals, and form conclusions about changes in the weather without any recourse to forecasting services. However, people in general find the world of information intimidating and they always have done so. Consequently they prefer to receive the most important parts of the information they need through an intermediary. Great volumes of information come to people as collected and structured by researchers and writers, or journalists and broadcasters. It is further subject to the intervention of editors and publishers and by peer reviewers if it is scientific information. People do not generally comment on this, except when they lose patience with the bias exhibited by a newspaper or the programme choice of a TV channel. This kind of intermediation is taken for granted When the information they require is crucially important to their lives and their work, people deliberately seek out intermediaries in whom they place particular trust. They consult these people, believe what they say, and act on their advice.

There is evidence of this from all parts of the world and from most important aspects of human life. Two kinds of example must suffice for the purposes of this paper. The author's own research has taken him into rural African communities and, with a local colleague, he has been able to conduct simple qualitative investigations of information use in the villages of Malawi [4]. The work used semi-structured interviews and focus groups to explore the attitudes and preferences of rural dwellers towards information provision. Research of this kind suggests answers to problems but does not claim to confirm them scientifically. Nevertheless, the evidence when set alongside the findings of other investigations that share similar topics and environment is very suggestive indeed When Malawian villagers need information on vital topics such as farming, health, education and literacy, and credit facilities, they valued the availability of the Ministry of Agriculture's community-based extension workers. However, they placed a particular weight on information passed on by local chiefs, village headmen and other community leaders. When this finding was compared with other studies it was observed that anything from 35% to 84% of respondents in surveys placed their greatest reliance on people close to them (family and friends, or elders and traditional leaders) for the information that really mattered. Only when such sources seemed inappropriate or inadequate did they tend to turn to official intermediaries such as the agricultural extension workers

This may seem foolish. Why should people trust unqualified informants in preference to those backed by the resources of officialdom? There are many reasons for this, but one is the perceived reliability of informal sources. What is more, that reliability is seen to exist even in circumstances that would generally arouse mistrust in industrialised countries. Getting reliable information can have a spiritual dimension and the endorsement of the community's ancestors is much desired Thus, in Northern Ghana for example, communities employ the mediation of spirit mediums and earth priests (*tendana*) to obtain messages from the ancestors to assist in agricultural problem-solving and decision making [5]. The messages they pass on give guidance on matters of wind, rain, crops and livestock, and play a part in the innovative and effective agriculture of the area. This may not seem relevant to the work of librarians, but it contains a basic lesson in the importance of intermediaries and the types of intermediaries most trusted. Such evidence from less developed countries is not seriously contradicted by what is to be found under quite different circumstances

Recent studies of the world of investment and finance have entered an area known as behavioural finance This draws on studies from a variety of sources. For instance, McGuire [6] shows how the opinions of their peer group are much more important to individuals than powerful arguments presented by experts or the media, whilst Katona [7] illustrates the importance of family and friends in influencing decisions on the purchase of stocks and shares Katona calls this 'social learning', but within the process it is possible to identify the influence of community opinion leaders Shiller [8] has recently used this type of evidence in a study of the behaviour of stock markets and their tendency to lose touch with economic reality. He shows how people are more likely to act on the advice of individuals than on more impersonal sources such as the media, or professional advisers such as stockbrokers. Widely available means of communication (the telephone in the 1920s, and Internet discussion groups in the 1990s) facilitate the operation of the process. The intermediaries vary greatly between these examples, but their presence and influence is the important thing

Gatekeepers

This line of argument comes closest to the special library when we look at a particular kind of intermediary, known as the technological gatekeeper. Back in the 1960s and 70s Thomas Allen [9] did important work on information and research, which still deserves to be essential reading for those involved in special library work. The technological gatekeeper was his discovery and he was indirectly responsible for the widespread use of the word gatekeeper when talking and writing about information work. Unfortunately, gatekeeper tends to be used rather indiscriminately to include all kinds of intermediaries, including librarians. This obscures the fact that Allen was talking about a very special phenomenon that was identified by his investigations in the context of industrial research and development.

The technological gatekeeper is an individual member of the organisation who keeps fellow researchers in touch with the broad world of research. This is done despite the fact that information work is not part of this individual's job description. Such people can be shown to discuss work-related problems with a much wider number of colleagues on a more frequent basis than the norm for the organisation. When looked at more closely, these individuals were also found to be much more inclined to acquire information from outside the organisation. For instance, they read the important journals and cultivated personal contacts in other organisations. The research went on to identify various other distinguishing characteristics of the gatekeeper's background and place in the organisation. The existence of networks of gatekeepers could also be identified between the various departments within an organisation. Allen is also cautious about the causal sequence involved in the phenomenon, but the most important point is that:

> The phenomenon of the gatekeeper is not an isolated one. Rather it is one example of a much more general class of phenomenon. There will always be some people who, for various reasons, tend to become more acquainted with information sources outside their immediate community. A large proportion of these people in turn attract colleagues from within the community who turn to them for information and advice. [9, p. 150]

It is probably best not to use the word gatekeeper too loosely, since Allen was able to be quite precise about who his technological gatekeepers were, and how they performed their role. Intermediaries in other contexts are likely to have distinct characteristics of their own, and librarians, though they are intermediaries, are certainly not gatekeepers in Allen's sense of the word. The gatekeeper is someone whom the special librarian ought to be able to identify, to cultivate and to cooperate with, to mutual advantage. The gate that the gatekeeper opens and closes can be used to admit the librarian to closer contact with the user community. Helpfully, Allen assures us that the gatekeepers are easy to identify, and that, once identified, information dissemination can be organised around them. Furthermore, the existence of gatekeepers and other intermediaries should reassure the librarian that a two step process of access to information (originator to gatekeeper, to user) is very much a normal phenomenon. In the light of this, a three-step process (originator to librarian, to gatekeeper, to user) need be no less natural.

Librarians

The most important conclusion arising from this is that while people continue to turn habitually to intermediaries, the independent end-user is not necessarily such a threat to the librarian as we are sometimes lead to believe. The message is not, however, that the librarian can cease to worry about this and that continuing in all the old professional working patterns will suffice perfectly well. A renewed confidence in the librarian's role is based on a fresh view of what the librarian must do. This could be described as reintermediation. Marfleet and Kelly [10] describe this as a demystification of information retrieval, in which the librarian must recognise the greater independence of the end-user. The librarian cannot resist or ignore this, so must develop an open dialogue with users that will point the way towards constant adaptation and enhancement of services. The nature of the new, or modified, services is partially a matter of speculation and must vary from organisation to organisation. There are, however, some strong and convincing suggestions in the literature, of which it is only possible to sample a few of the most recent contributions

Many of these are concerned with working more closely with the content of information resources and adapting skills to the knowledge management area. Corcoran [11] suggests various approaches to this These include taking a more active role in the buying and selling of electronic information content. This involves the librarian in financial decisions, and the business of making bargains with commercial organisations than ever before. The librarian can then get involved in the more technological side of making this information content available at the desk of the end-users, through means such as intranets Analysis of information so as to identify and feed the key data into the research and development process is another step in this direction that is taken by some librarians, who thus become much more a part of the research and development team. Librarians as knowledge managers can also play a significant role in the organisation's shift towards e-business, exploiting their involvement with both content and technology [12].

There is considerable potential for the librarian to become involved with the process of improving access to significant Internet content. The ideas embodied in traditional cataloguing and classification are capable of being adapted very effectively to the cataloguing of electronic resources [13]. At present the search engines are largely dependent on the presence of suitable keywords in the text of web documents so as to be able to retrieve them. The World Wide Web Consortium (W3C) has developed the Resource Description Framework (RDF) into which metadata of different types can be entered. This creates a major opportunity for skilled practitioners to apply accurate and helpful descriptions to resources. Fichter [14] includes this within the role of the Search Master, which she defines as providing accurate retrieval of data from the Internet. In effect, the Search Master provides human intervention to compensate for the crudity of the search engines Roles such as these demand a very strong grasp of technology in addition to a solid base in the skills of the librarian

Rikowski [15] describes the new professional role as a bridge between the library and information function, and the information technology function in the organisation. This leads quite naturally into another role identified by many of the commentators, which is that of trainer or, indeed, educator Carbo [16] stresses the need for what she calls mediacy, which consists of 'the competencies needed to deal with the technologies, information content, and the different media' [16, p. 399]. The librarian not only needs to acquire these competencies, but to pass them on to the user community From the point-of-view of the vendor, this is also a major issue and they see librarians as partners as well as clients. The role of partner is to link the vendors to the end-users and to help ensure that these users have the skills needed to make the best use of the content that is purchased for them [17] All of this is extremely challenging and every suggestion to be found in the literature (even in the small sample used here) may not be fully convincing to the practitioner. In the first place, it is the general tendency that is important The literature stresses change, and it is clearly the responsibility of practitioners to select the most relevant and convincing aspects from it so as to be effective intermediaries in their own particular professional surroundings

Conclusion

Naturally as an educator in the Information and Library Science field, the author views the implications of this very much in terms of the education and training of professionals Rather than protecting values inherited from previous generations, it is the role of educators to help the sector to cope with change. The educator is thus the ally of the practitioner in selecting which professional paths to follow. There is a large and growing demand for information professionals with the skills of the librarian [18]. The point to be aware of is that the people in demand are those whose skills are enhanced in the ways outlined above. The Association for Library and Information Science Education (ALISE) has recently completed a major examination of professional education for our field in the USA [19]. First amongst its conclusions is the perception that the American LIS schools are not merely dealing with libraries and library-specific operations, but are addressing broad-based information environments and information problems. The educators clearly do not believe that the role of librarian as intermediary is finished. They believe that, in fact, there is an exciting future for librarians, if they choose to accept it. The original contention of this paper that the role of the intermediary is a universal one, identifiable over time and across geographical regions, is supported by this fresh optimism. The evidence suggests that not only will those seeking information they feel that they can trust always seek out intermediaries, but there is an important place for librarians amongst the ranks of those intermediaries.

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Trends in using CD-ROM in academic libraries of three South Asian countries – Pakistan, Bangladesh and Sri Lanka

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High hopes were attached to CD-ROM technology at its inception in bridging the gap between 'information rich' and 'information poor' countries. However, this technology is entering the libraries of developing countries at a much slower pace than expected. This paper explores the use of CD-ROM in academic libraries of three South Asian countries, namely Pakistan, Bangladesh and Sri Lanka. A questionnaire was used for data collection and 39 academic libraries participated in the study. It was found that only one-half of the libraries were using CD-ROM technology and 65% of these were facing financial difficulties in sustaining it. Two-thirds of the libraries have only up to two CD-ROM workstations and, on average, libraries have just over four CD-ROM titles. Most of the library staff was self-trained and only a few libraries were undertaking promotional and user education activities This paper suggests that donor agencies and leading publishers should pool their resources to develop full-text CD-ROM products to help sustain the flow of digital information to these countries.

Introduction

The widening gap between so-called 'information rich' and 'information poor' countries has been the focus of many studies during the last few decades. Most researchers are agreed that a multitude of factors was responsible for it and proposed different solutions for bridging this gap. However, after the introduction of CD-ROM, many of them were convinced that this technology would play a vital role in bridging the divide.

Many authors, during the early days of CD-ROM, had high praise for this technology as an economical alternative to online searching [1, 2, 3]. Keylard [4] considered CD-ROM a useful technology for libraries and information centres located in 'isolated' areas. Nicholls and Majid [5] felt that CD-ROM was suitable for the prevailing information infrastructure and requirements of developing countries. Other advantages of CD-ROM put forward were:

- convenient, easy and unlimited access;
- microcomputer-based technology;
- powerful and user-friendly interfaces;
- non-dependence on telecommunication networks;
- access to a substantial portion of world literature;
- easy budgetary control due to fixed CD-ROM database cost;
- inexpensive training tool, etc. [6, 7, 8, 9].

Library and information professionals in developing countries were excited to have access to information on a scale, speed and convenience previously unknown to them Several libraries in developing countries took the initiative and successfully established CD-ROM based information retrieval facilities [10, 11, 12]. Several donors also came forward with projects to demonstrate the potential and appropriateness of this technology to developing countries [13, 14]. As initially CD-ROM products were largely bibliographic in nature, and realising the poor and outdated library collections in developing countries, several donor agencies started supplying full-text materials on CD-ROM, particularly prepared for developing countries [15, 16, 17, 18]. Kanamurgire [19] proposed that leading CD-ROM publishers should cooperate with donor agencies to make CD-ROM products more affordable for developing countries.

An important issue related to the establishment and maintenance of IT-based services in developing countries is their ability to sustain these facilities Sustainability, as applied to information systems, is the maintenance and continuity of an information system over the long term, enabling it to perform its functions effectively in accordance with its user community [20]. Experience has shown that, with the exception of a few, most of the developing countries were unable to sustain these activities beyond the period of donor financing [21, 22, 23]. Many libraries failed to obtain adequate funding from their parent organisations, in spite of assurances given by them to donors for the continuity of the established activity. Another problem in sustaining the CD-ROM service in developing countries can be the lack of a culture to pay for library services [24]. Deschatelets and Legault [25] reported that only 14% of the 240 African sites surveyed were charging users for use of the CD-ROM facility.

The literature shows that many libraries in developing countries are not using CD-ROMs due to inadequate financial resources, equipment and trained manpower. Even in those libraries that were using CD-ROM, a majority of them encountered difficulties in sustaining it. However, not much is known about the use of CD-ROM technology in academic libraries of South Asia, particularly Pakistan, Bangladesh and Sri Lanka. The available literature is basically descriptive in nature, without adequate data to corroborate the views and perceptions presented. The objective of the study reported here was to explore: the trends in using CD-ROM in the academic libraries of these countries; reasons for its possible under-utilisation, and ways to rectify this situation. These countries were selected due to similarities in their economic conditions, educational infrastructure and the status of their academic libraries.

Method

A questionnaire was used for collecting data from the three countries. *The Directory of Universities in Pakistan* (1998) was used for identifying names, administrative status and mailing addresses of government supported and private universities in Pakistan. The home page of the University Grants Commission (UGC) of Bangladesh was visited to get names and addresses of universities in Bangladesh Home pages of individual universities and some other sources were consulted for obtaining the required information about Sri Lankan universities.

The questionnaire consisted of four sections with 26 questions Section one sought information on the name of the academic institution, administrative status, and number of library users and library professionals. Section 2 was for those libraries that were not using CD-ROM technology It collected data on the possible reasons for not using this technology and whether they had any future plans for its implementation. Section 3 solicited data on the CD-ROM products acquired by the participating libraries, their use for performing various library operations, and methods used for training library staff in the use of CD-ROM technology. The last section of the questionnaire obtained data on CD-ROM access policies implemented by the participating libraries, their charging policy, and promotional and user education activities It also explored the perceptions of respondents of problems faced by academic libraries in implementing CD-ROM technology. The survey was conducted during January-March 2000 and a total of 75 questionnaires were mailed to academic libraries in three participating countries. Thirty-nine filled-in questionnaires were received back, an overall response rate of 52%.

Results and discussion

A total of 39 academic libraries from three South Asian countries are represented in this study – 19 from Pakistan, 12 from Bangladesh and 8 from Sri Lanka (Table 1). Over three-quarters of them were from government supported academic institutions and the remaining one-quarter from the private sector.

Table 1 *Type of participating libraries (N=39)*

Country	**Government supported**	**Private**	**Total**
Pakistan	14 (73 7%)	5 (26 3%)	19 (100%)
Bangladesh	7 (58 3%)	5 (41 7%)	12 (100%)
Sri Lanka	8 (100%)	–	8 (100%)
Total	**29 (74.4%)**	**10 (26.6%)**	**39 (100%)**

Table 2 *Status of CD-ROM use (N=39)*

Country	**Using**	**Not using**	**Total**
Pakistan	10 (52 6%)	9 (47 4%)	19 (100%)
Bangladesh	6 (50%)	6 (50%)	12 (100%)
Sri Lanka	4 (50%)	4 (50%)	8 (100%)
Total	**20 (51.3%)**	**19 (48.7%)**	**39 (100%)**

Table 3 *Reasons for not using CD-ROM technology – multiple response (N=19)*

Reason	**Country**			**Total (N=19)**
	Pakistan (N=9)	**Bangladesh (N=6)**	**Sri Lanka (N=4)**	
Lack of CD-ROM equipment in the library	6 (66 7%)	6 (100%)	3 (75%)	15 (78.9%)
Unavailability of budget for purchasing CD-ROM products	6 (66 7%)	5 (83 3%)	4 (100%)	15 (78.9%)
Limited computer knowledge among the library professionals	2 (22 2%)	5 (83 3%)	–	7 (36.8%)
Lack of information retrieval knowledge among the library professionals	1 (11 1%)	3 (60%)	-	4 (21 1%)
Library users do not often ask for CD-ROM products	1 (11 1%)	-	1 (25%)	2 (10 5%)
CD-ROM not a useful technology for our library	–	–	–	–
Printed sources are better than electronic sources	–	1 (16 7%)	–	–

Availability of CD-ROM technology

The participating libraries were asked if they were using CD-ROM technology for meeting the information needs of their patrons and/or for performing various library operations It was found that only 20 (51 3%) of the surveyed academic libraries were using CD-ROM technology (Table 2). It was interesting to note that the proportion of libraries using and not using CD-ROM was exactly the same for Bangladesh and Sri Lanka It was also found that 52% of the libraries from government supported academic institutions and one-half from private institutions were using CD-ROM technology.

Those libraries that were not using CD-ROM technology were asked to indicate possible reasons for it. Two major reasons, given by 78.9% of the libraries, were lack of CD-ROM equipment and unavailability of a budget for purchasing CD-ROM products (Table 3) Seven libraries, five from Bangladesh and two from Pakistan, reported that they were not using CD-ROM technology because of limited computer knowledge among their library professionals. Two other reasons given were lack of information retrieval knowledge among library professionals (four libraries) and lack of interest among library users in CD-ROM products (two libraries).

Table 4 *Plans to acquire CD-ROM technology during the next year (N= 19)*

Country	Planning to acquire	Not planning to acquire	Total
Pakistan	5 (55.6%)	4 (44.4%)	9 (100%)
Bangladesh	5 (83.3%)	1 (16.7%)	6 (100%)
Sri Lanka	4 (100%)	-	4 (100%)
Total	**14 (73.7%)**	**5 (26.3%)**	**19 (100%)**

Table 5 *Possible funding sources for acquiring CD-ROM products – multiple response (N= 17)*

Funding source	Country			Total (N=14)
	Pakistan (N=5)	Bangladesh (N=5)	Sri Lanka (N=4)	
Through requesting special grant	5 (100%)	1 (20%)	2 (50%)	8 (57.1%)
Through regular library budget	-	4 (80%)	2 (50%)	6 (42.9%)
Through international donors	1 (20%)	3 (60%)	-	4 (28.6%)
Through gifts	1 (20%)	3 (60%)	-	4 (28.6%)

Table 6 *Financial problems in sustaining the CD-ROM service (N=20)*

Country	Financial problems		Total
	No	Yes	
Pakistan	4 (40.0%)	6 (60.0%)	10 (100%)
Bangladesh	2 (33.3%)	4 (66.7%)	6 (100%)
Sri Lanka	1 (25.0%)	3 (75.0%)	4 (100%)
Total	**7 (35.0%)**	**13 (65.0%)**	**20 (100%)**

Those libraries that were not currently using CD-ROMs were asked if they have any plan to do so within one year. Fourteen (73.7%) of the libraries expressed their intentions to acquire CD-ROMs during the next year (Table 4).

These libraries were further asked to indicate source(s) they intend to use for establishing a CD-ROM facility. Of the fourteen libraries in this category, eight (57.1%) reported that they would ask their parent institution for a special grant for this purpose (Table 5). Six libraries were considering using their regular library budget to finance CD-ROM. Four libraries each were depending on gifts and/or assistance from international donors. It was noted that all academic libraries in this category from Sri Lanka were planning either to make a special request to their parent department or use the library budget for this purpose. On the other hand, 60% of the academic libraries from Bangladesh, currently not using CD-ROM, were relying on gifts or assistance from international donors.

Trends in using CD-ROM technology

Of the 20 academic libraries, currently using CD-ROM, 14 (70%) were using it to provide an information searching service for their users. Three libraries were using it both for user searching and performing various library operations, such as collection development, cataloguing, reference, etc Another three libraries were using CD-ROM only for library operations.

Table 7. *Training methods used for developing CD-ROM based information retrieval skills – multiple response (N=20)*

Training Method	**Number of libraries**	**Percentage**
Self-learning through reading manuals/ documentation	16	80
Through trial-and-error	10	50
Through attending short training courses and workshops	8	40
As a part of course-work during professional studies	4	20
Staff attachment with institutions already using CD-ROM	3	15

Libraries using CD-ROM were asked if they faced financial difficulties in sustaining their CD-ROM service. Thirteen libraries (65%) reported such difficulties – 60% from Pakistan, 66.7% from Bangladesh and 75% from Sri Lanka (Table 6). A further analysis showed that 80% of libraries from government supported academic institutions and 20% from private sector institutions were facing financial difficulties in sustaining their CD-ROM service.

Staff training

Libraries were asked about the training methods used by their staff for learning about CD-ROM based information retrieval skills. It was found that staff of the participating libraries used a variety of learning methods. Sixteen (80%) of the libraries reported that their staff trained themselves by using manuals (Table 7) Staff in ten (50%) of the libraries used the *trial and error* method. Eight libraries (40%) revealed that their staff attended short training courses and workshops. It was noted that most library staff used informal methods for training themselves and only a few received formal instruction. It is possible that informal methods of learning alone might not be sufficient to develop necessary competency.

Table 8 *Number of workstations for library patrons (N=20)*

Number of workstations	**Number of libraries**	**Percentage**
1	9	45
2	6	30
3	1	5
4	2*	10
5 or more	2*	10

* under the CD-ROM network

CD-ROM facility for patrons

It was found that nine (45%) of the libraries had only one CD-ROM workstation for library patrons (Table 8). Another 30% of libraries had two workstations for this purpose. Only two libraries had five or more CD-ROM workstations for their patrons and these were also networked.

Fifteen (75%) of the libraries had five or less CD-ROM titles. Only four (20%) of the libraries had more than ten CD-ROM titles in their collection. Two of them had most of their CD-ROMs obtained with books on various software packages or programming languages. Of the thirteen libraries that provided information on the source of acquiring their CD-ROM titles, seven libraries reported procuring more than 50% of their titles through the library budget while six libraries received one-half of their CD-ROMs through international donors.

In total 20 academic libraries had 85 CD-ROM titles in their collections, excluding CD-ROMs containing software or programming language(s). Nearly one-half of the CD-ROMs were bibliographic in nature whereas one-quarter of them were reference products such as encyclopaedias, atlases, fact books, yearbooks, dictionaries, etc. Over 15% of the CD-ROM products acquired by these libraries were full-text basically carrying journal articles.

CD-ROM access policy

All those academic libraries having a CD-ROM facility provided an information searching facilities for their faculty members. Of the 20 libraries, 17 (85%) libraries each allowed their students and research associates to use this service (Table 9). Nine (45%) of the libraries permitted external users, mostly from other academic institutions and government agencies, to use their CD-ROM facility.

Libraries were asked about their access policy for using CD-ROMs. Users at some libraries were required to fulfil more than one access requirement. Twelve (60%) of the libraries reported that their users were required to make a prior appointment with library staff, whereas eight (40%) of the libraries required approval from the library chief or his/her representative (Table 10). Seven (35%) of the libraries required faculty members and students to bring a recommendation letter from the head of the academic department for using the CD-ROM facility. Only four libraries had a *walk-in and use* policy for their patrons.

At nine libraries, library staff were responsible for searching information for their users, whereas three libraries required their end-users to conduct their own searches However, eight libraries had a flexible access policy where both intermediary and end-user searching was available. Twelve libraries had a policy of allowing their users either to obtain the retrieved information in the form of computer printouts or download it. Three libraries provided only a downloading facility.

Only four (20%) of the participating libraries, three from Pakistan and one from Bangladesh, charged their users for printing out information. Out of nine libraries that allowed external users to use the CD-ROM facility, five (55.5%) charged for them – four from Pakistan and one from Bangladesh. None of the Sri Lankan academic libraries charged their internal or external users. This was in spite of the fact that previously 13 libraries revealed that they were facing financial difficulties in sustaining the CD-ROM service. The lack of a culture for charging for library services in these countries might have contributed to their financial difficulties.

Table 9 *Type of users entitled to use CD-ROM facility – multiple response (N=20)*

User type	Number of libraries	Percentage
Faculty	20	100
Students	17	85
Research associates	17	85
University staff	13	65
External users	9	45

Table 10. *Access procedure for using CD-ROM – multiple response (N=20)*

Access procedure	Number of libraries	Percentage
Prior appointment with library staff	12	60
Approval from the library chief or his/her representative	8	40
Recommendation letter from head of the academic department	7	35
Filling a search request form	5	25
Walk-in and use the facility	4	20

Promotional activities and user education

It was found that of the twenty CD-ROM using academic libraries, only six (30%) libraries – four from Pakistan and one each from Bangladesh and Sri Lanka – undertook promotional activities for popularising the CD-ROM service among their users The situation of user education was more disappointing as only four libraries, three from Pakistan and one from Sri Lanka, conducted user education programmes to familiarise patrons with the basic CD-ROM searching techniques. It is worth noting here that 11 libraries encouraged their end-users to conduct their own searches. Considering the overall low computer literacy among library users in these countries, it might be difficult for them to search CD-ROM databases effectively without adequate training.

Number of CD-ROM searches

Libraries were asked what was the average number of CD-ROM searches conducted by them each month for their users. It was found that 56.3% of libraries conducted less than 50 searches monthly (Table 11). Only three (18.7%) of the participating libraries reported conducting more than 150 CD-ROM searches per month.

The average number of searches conducted per month for every 100 users was also calculated for eight libraries that provided data about the total number of their library users It was found that at one library 67 CD-ROM searches were conducted for every 100 users in a month. At two libraries, up to 9 CD-ROM searches were conducted for every 100 users. At the remaining five academic libraries, less than 1 CD-ROM search was conducted per 100 library users in a month. Several factors such as limited number of CD-ROM workstations and databases, rigid access policies and procedures, and lack of promotion and user education might explain the under-utilisation of this facility

Table 11. *Average number of CD-ROM searches conducted per month (N=16)*

Number of searches	Number of libraries	Percentage
1-50	9	56 3
51-100	1	6.3
101-150	3	18 7
More than 150	3	18 7

Perception of CD-ROM use in academic libraries

Libraries participating in the survey were asked about their opinion on the use of CD-

Table 12 *Reasons for the under-utilisation of CD-ROM technology – multiple response (N=18)*

User Type	Number of Libraries	Percentage
Limited computer literacy among library professionals	15	83.3
Inadequate CD-ROM databases and/or equipment	15	83 3
Lack of awareness among library professionals about the potential of CD-ROM Technology	12	66.7
Limited computer literacy among library users	12	66 7
Lack of user training for CD-ROM based information retrieval	10	55.5
Inadequately trained library professionals in CD-ROM searching/use	10	55 5
Inadequate publicity for the CD-ROM facility	7	38 9
Rigid CD-ROM use policies implemented by some academic libraries	3	16 7
Discouraging attitude of library professionals towards their users	1	5.6

ROM technology in academic libraries in their country. All libraries, except two from Bangladesh, felt that CD-ROM was under-utilised (Table 12) Two major reasons for this under-utilisation, as reported by fifteen (83.3%) of the libraries, were limited computer literacy among library professionals and inadequate CD-ROM databases and/or equipment. It was interesting to note that earlier nearly 80% of the libraries not using CD-ROM also gave these two reasons for their inability to use this technology (Table 3)

Two other reasons, reported by twelve (66.7%) of the libraries, were lack of awareness of the potential of CD-ROM and limited computer literacy among library users. Other reasons put forward were lack of user training (ten libraries), inadequately trained library professionals (ten libraries) and inadequate publicity given to the CD-ROM facility (seven libraries)

Conclusions

During the early days of CD-ROM, high expectations were attached to this technology in solving the information-related problems of developing countries. However, even after more than fifteen years since its introduction, it appears that CD-ROM technology has failed to have a big impact on the libraries of developing countries. Although, there just might be some 'information oasis' in certain developing countries using latest information technology, the overall scenario is bleak. With CD-ROM/DVD having become a standard technology for libraries in developed countries, libraries in developing countries are still struggling for its introduction and sustenance.

It was disappointing to note that nearly one-half of the academic libraries in the three South Asian countries surveyed were not using CD-ROM technology. This situation is particularly disappointing, as the CD-ROM drive is now part of computer hardware and several CD-ROM/DVD products are available free of charge. This probably shows the lack of initiative and appreciation for this technology among the library management in these countries. Even the situation at those libraries that were using CD-ROM was not that promising. Problems such as the small number of CD-ROM databases, insufficient number of CD-ROM workstations, inadequately trained library staff, and financial difficulties in sustaining the activity were common among these libraries. Besides other factors, the negligible number of CD-ROM searches conducted at these libraries could be attributed to inadequate publicity, lack of user education and (over) bureaucratic policies and procedures.

In an era when a large number of useful information products are only available in digital format, the gap between so-called 'information rich' and 'information poor' countries is widening further. Rather information poor countries are now under the threat of 'information starvation'. Due to similar reasons, high hopes now pinned to the Internet in bridging this information gap may also be dashed, resulting in an 'international digital divide'. To overcome this unfortunate situation, library management in developing countries need to review their policies and, instead of heavily depending on traditional information sources, should set aside adequate resources for collecting digital information materials. They also need to give priority to staff training, library promotion and user education in regard to electronic information sources.

Experience has shown that many library and information facilities developed by international donors in several developing countries could not be sustained, mainly due to lack of resources. There is a need that these agencies, instead of making isolated attempts to strengthen a few libraries for a short duration, should pool their resources and take appropriate measures for sustaining the flow of information to developing countries For this purpose they may also seek the co-operation of world leading publishers to put their full-text materials on the CD-ROM/DVD for distribution to developing counties at an appropriately subsidised rate. There is little likelihood that these publishers would loose any significant revenue as most of these countries are not their big customers. However, such an effort may help reduce the widening information gap between developed and developing countries

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New information perspectives

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Michael A Mabe

The shifting terminologies of information
David Bawden

Learning Area Network: information dissemination and online discussion in an education environment: the Capabil-IT-y project
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Aslib Proceedings is a long-standing professional journal of international repute, which has a large and wide subscriber base. The journal brings currency, authority and accessibility to the reporting of current research, issues and debates in the broad area of information work. Above all the journal wishes to provide research and comment in a form that is easily and quickly understood: a fresh, rigorous, but unfussy, writing style is what is aimed for. The needs of busy practitioners (and academics) are very much in mind. Articles are refereed to meet the need for accredited and authoritative information. To ensure that this does not result in an unacceptable loss of currency, articles are speedily refereed by the journal's large, eminent and multi-disciplinary Editorial Board (assembled for just such a purpose). In some cases they may be referred to an external panel of consultants. The journal's monthly publishing pattern helps in maintaining the currency of reporting. In consequence the submission of research in progress articles is encouraged.

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The future of academic libraries

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A review of the future of academic libraries that draws initially on a generic model to describe the components of all library systems. Touches upon some economic changes and looks for evidence in statistical trends derived from United Kingdom reportage. From this extrapolates scenarios relating to the function of libraries as a collection of resources, as a physical place, its role in organising information and its service function. Library collections will continue to exist but described in different ways, whilst physical collections will mutate into multi-functional spaces. Knowledge management will become increasingly important and the overriding shift will be towards a service and support role. The librarian's role is also discussed and changes summarised.

I have seen the future and brother it is murder.
Things are gonna slide in all directions...
Leonard Cohen, *The Future,* [1].

Introduction

The future of academic libraries is no small subject to cover and probably cannot sensibly be achieved in anything less than a scholarly monograph. This modest attempt arises from a request to the author to address the UK's Standing Committee on National University Libraries with a view to stimulating debate and as such is necessarily succinct and even some ways idiosyncratic in its approach.

The topic is by no means new. Thompson [2] was predicting the end of academic libraries as far back as 1982 (though in many senses much of what he was predicting has not come about) and more recently Tom Wilson [3] suggested a reformulation of the role of academic libraries in the context of changed parameters. We could equally argue that libraries have a set of enduring values, which should always, and have always, informed what they do. In any event there is no doubt that libraries are changing and in some ways in a predictable fashion; what this paper tries to do is to identify some of these and to extrapolate them in a discursive way without necessarily drawing any firm conclusions.

A starting point would be to try and model the function of the academic library and to that end firstly let us look at a paper by Brophy [4] in which he attempts to describe a generic model for the library which straddles the traditional, hybrid and electronic in one and is built upon what he refers to as 'the common mission' to enable users to gain access to the information that they need. Brophy proposes on the one hand a universe of information adequately organised and utilising metadata as document surrogates, and on the other a universe of users sub-divided to specific user populations. The function of the library as he sees it is – through its core processes – to bring these together. This is a highly mechanistic view and to some extent overlooks the subsidiary and associate roles, such as training and user support, which are likely to predominate as the core processes are effectively automated out of the system, but it is helpful in informing some of the functions an academic library needs to perform in the future. As Brophy says:

> libraries... stand on the threshold of new paradigms of service and whilst [traditional functions] are not being discarded wholesale, libraries will be much more active participants in the exploitation and the

organisation of information and knowledge.. [4, p. 167].

So the problem is not that the fundamental purposes of libraries are changing but that the relative importance of different aspects, given a different context, are shifting. Let us look at some evidence by way of figures to support the notion of change and indeed decline in some traditional activities. In 1992 the author's own University library was buying about 1,800 journal titles, low it must be admitted for a University, at a total cost of £161,000. If we argue that each journal comprises, say, 60 articles per annum then the average cost of procurement per article, excluding labour costs, would have been £1.50. As of today and using the same metrics and including free journals, we are delivering around 240,000 articles – the unit cost per item has dropped to just over a pound – a decrease of about 30%. Put crudely, the cost of information is declining, and though it is accepted that there are arguments about the cost/quality equation, information is becoming cheaper as well as more plentiful.

Why has this happened? It could be argued that it is the result of a number of factors, but primarily it has been due to the emergence of consortial purchasing of electronic bundles of serials. It could be argued that this is a matter of buying a large amount of redundant materials, a point to which we will return, but nevertheless, not only is the library providing more volume to its users, it is making significant gains in labour costs, reducing dependency on inter-library loans and beginning to reassert the plurality of resources needed to support a university, where more investment brings more material and proportionately less staff effort. Collective purchasing delivers real benefits and also incidentally makes it difficult to understand the merits of subscription service charges from agents

Of course this model itself may not be sufficiently robust and is not necessarily transferable – it relates to the licensing of scholarly data and probably works only in that context. And there are limitations: licenses are still confused as to how they treat remote users; there are still a variety of authentication procedures demanded and even servicing different buildings is not always simple or accepted. So the emergence of licensing agreements has brought about benefits, but at the same time raised new questions both for us and indeed for publishers. As Fred Friend [5] has said 'consortial purchasing is not the only feature of the new way of working, but is a critical feature that we have to get right'

Some statistical evidence

Let us now turn to library usage. On the basis of the SCONUL figures until 1998/99 [6] the use of libraries determined by gate figures is in decline. It is acknowledged that there are some differences, but overall levels of usage per user are reducing year on year. What is happening is that usage is becoming more distributed and more screen based as a consequence of electronic delivery of material and the drift to work based learning, distance learning and so on. And if we were to remove IT clusters from that equation (that is not to argue that this is the right thing to do), then the decline becomes even sharper. This is reinforced by the figures on occupancy; in a short debate on LIS-SCONUL earlier in the year [7] Winkworth reported that SCONUL figures show 'confirmation of a long term trend to lower seat occupancy. UK average occupancy drops from 45% in 1992/93 to 39% in 1998/99 and in some Institutions the drop is even sharper'. And even space per FTE, despite the heavy investment made in Learning Centres and the like since Follett [8], is also declining. Libraries have ceased to be the first resort for users and are becoming a complementary source to off-campus use, distributed and net based services, home study and public libraries.

So on the one hand we have seen the beginnings of the stabilisation of journal prices and extended access – taking the journal back to what it once was – a widely available means of disseminating the results of scholarship and research On the other hand we have the beginnings of the decline in the use of traditional services and physical resources

Some definitions

Another way of looking at the whole issue is to ask what we mean by libraries. Here the key sources are papers by Rusbridge in 1998 [9, 10] on hybrid libraries and the like, where he gave a wide ranging technical assessment of libraries but also a functional analysis. To paraphrase, we can define libraries in four distinct ways:

- library as a collection (of resources);
- library as a building or space;
- library as function, that is the organisation of information;
- library as a service, a supporting role in the context of the organisation.

We shall want to look at each of these in turn and try and extrapolate some points for the breakouts.

Library as a collection

The notion of the library as a collection of resources in some senses seems likely to last Even in the electronic context there is still a need to prescribe boundaries so that the collection adequately meets the needs of the user base. At an organisational level, licensed resources will need to be selected and evaluated, contracts negotiated and all placed within the context of a suitable navigational system. But the boundary definitions of collections maybe much more fluid and might well be defined in ways other than through professional judgement – ways such as national or collective agreements, historic patterns of usage, or the explicit trapping of user demands (web logs for example). Scoping collections at, say, research group level, or at the course or even individual level will also be needed but will not necessarily be the responsibility of libraries.

Much of this suggests that, though there are tasks here in selection and procurement, they are becoming less pronounced, so that old style collection management is conceivably becoming redundant.

As to book collections, it was mentioned earlier that it seems to have become accepted as wisdom, that books will continue as the major source of study material given their inherent convenience and browsability. Indeed books just do not seem to be the centre of concern that they perhaps once were. If you look at the summary of the QAA learning resource category, again circulated by Winkworth [11] earlier this year, it did not identify a short fall in text books as being a problem, implying either that book provision in almost all universities is now entirely adequate or, alternatively, that we have collectively swept the issue under the carpet. The suspicion is that we are all continuing to struggle to meet student demand, which regularly features at the top of student opinion surveys, and that the problem, despite our best efforts, remains intractable.

What has emerged very quickly over the past six months has been the growth of e-book initiatives such as Questia [12], Headfiller [13], Net library [14] and so on; all of which are seeking to address student text book requirements. Whether these services, which are largely derived from the US academic system, are transferable to the UK is doubtful and whether there are great benefits to be had from delivering substantial textbooks to screen (with all the problems of reading and/or printing and how to handle the subsequent charges) remains to be seen, but what is certain is that we can no longer assume that physical book collections will be at the centre of the delivery of learning, as was assumed even a year ago.

There is a third strand to the collection building debate and that is the growth of internally published material at the individual or corporate university level, which may well precede traditional publishing. There is a steady growth of quality material now available on the Web and accessible through search engines or through the more specialised web portals. While not wanting to dwell on the self-publishing, self-archiving debate, such personalised publishing will, in time, undermine traditional publishing structures and will most certainly bring down overall pricing. We will see a burgeoning of in-house learning materials and of grey literature generally, much of which, at this point anyway, is not subject to any effective bibliographic control. There will be a need to create structures to deal with this emerging knowledge corpus and libraries would seem to be the obvious candidates so to do.

In the corporate sector there is a long tradition of marshalling corporate knowledge to the organisation's advantage. By contrast universities which are, and/or ought to be, knowledge organisations par.excellence – we disseminate knowledge through research outputs, we distil knowledge into easily assimilated chunks to support learning and so on – have a poor track record of exploiting their intellectual property rights. However, vice chancellors are now becoming bullish about asserting their rights over material and the suggestion is that we may all have to think seriously about the creation of knowledge management frameworks to set alongside our other corporate portal activities. There is a case to bring some activity back in-house and to create appropriate frameworks where these things can happen. However, at the same time we should not underestimate the complexities of publishing; there are many hidden costs, which tend to disguise their true economics.

Library as a space

So what of the library as a physical space? Libraries as a physical environment seem on the surface to be the least likely to exist in the digital future. As we have seen already there has been a steady reduction in 'gate' figures over the past few years brought about, one supposes, by academics' and researchers' increasing reliance on the screen as their way into resources and coupled with students studying elsewhere or using alternative sources. Access to web services can be obtained from most places with adequate connectivity, and with the increasing impact of mobile communications that means literally anywhere. Digital libraries will be free of the constraints of delivering audio and graphics and universally portable, as each individual becomes able to access and maintain their own institutional view.

The counter argument to this futuristic view is the rather bleak study experience it engenders, one of loneliness and isolation. Thus the argument goes that we will still need spaces where users can come together as a group, even if they are working independently. Spaces which are comfortable for thinking and working and are conducive to long periods of screen use and which have in place support systems and help as well as quality output devices such as printers or high definition screens. The traditional library space is already in decline and giving way everywhere to multipurpose learning centres already present in many universities and encompassing an enormous variety of functions ranging from IT access to career support, from student guidance to special needs.

Library as function

If the core process of libraries is organising the information universe to enable easy access by users, then we can argue that libraries have an unchallenged role to provide the relevant tools for that to continue in the web domain. Building web portals, creating and adding value to web resources are all central to future educational systems, which will become as resource based as they were once teaching lead. It implies customisation, rights management, repackaging and reformatting and so on. We will need to be active in identifying content, disseminating and re-presenting resources to suit different audiences and markets. It is all about becoming more user centred and less collection focused or function dominated.

It is also about true interoperability between very different data sets and not just cross database searching, or addressing distributed Z39.50 catalogues. It is about permitting users to move from document to document, from idea to idea and about seamless moving between collections without losing context. We are already seeing the benefits of citation searching in e-journals sets – you could argue that citation searches have always been a highly effective retrieval mechanism but too complex – now click and view makes that easy. So we will need to come to terms with new paradigms of searching to sit alongside new information structures where collections and links dominate whilst titles and articles are in decline.

And just before we become too excited about building portals perhaps we need to remind ourselves about the benefits of collaboration, and not try to create institutional structures when national or collaborative enterprises will do just as well, or where they are simply not needed. One suspects that users have already decided on the relative benefits of Google or Northern Light. For many students the library will, and already does, comprise the Internet and little else. Use of the Net already outstrips library use by a significant factor and the JISC funded Aberystwyth studies [15] confirm that: 'Students use search engines for most information searches – whether academic or not. The 'Internet' is the first resort (and for some the last resort). Gateways? What are they?'

Library as a service

If there is one aspect of the future which seems to meet universal agreement it is that libraries will need to become even more service centred than before and bring higher levels of learning support and research support to a user body which is becoming more distributed. Indeed if you imagine that all libraries will have the capability of delivering most anything then the level and quality of support, the level of customer support and service may well be the central determinant as to whether a service is successful or not.

Part of that agenda is information literacy; but at what point does information literacy stop and the educational process begin. Certainly in disciplines such as health the drive towards evidence based learning is inexorable suggesting that learning resources become core to the business. This is not inevitably the case and many e-learning initiatives will see the digital library as being peripheral and even absent from the package, depending on which discipline and the depth of the study required Screen based systems are no respecters of tradition and libraries will need to seek relevant partnerships so as to ensure a supportive place in e-learning environments. We have no prior right to assume the centrality of digital libraries in learning environments. But some content is inevitable and someone will have to organise that and ensure rights management and the like are dealt with. Perhaps the point is that just as there is convergence in technology so there is increasing convergence in content – the Web is unforgiving as to format or source so that we are likely to see licensed copyright and web originated or self authored material juxtaposed in, for example, an e-course

Finally, to repeat the point, libraries will need to become much closer to their users than now. We are all aware of issues such as authentication and authorisation, but the argument goes beyond that to seeking a much fuller understanding of user needs even to the extent of pre-empting those. There is much to learn from the 'dot coms' about the way in which they not only register users but also elicit needs, prompt them about new services and resources and generally manage the virtual community. Most of our systems are designed to effectively handle objects and collections, whilst what we need is to be able to manage and relate to users to establish virtual communities which can enable peer support and feedback Why not allow students to recommend or review books on the Opac? Why don't systems provide a personal greeting and tell you what is new?

Summary

To try and summarise, it seems that the shift that is taking place is away from the management of physical resources towards exploitation, support and the creation of pathways and links to support our core mission of learning, research and innovation Such services will be even more focussed on the user and his or her needs than before, to the extent that they become highly personalised. Libraries will need to add real value to these processes in a way that is both measurable and unique.

And though we should not dwell on the role of librarians – in some ways we spend too much time contemplating our future, whilst forgetting that the pressures of change we are currently experiencing are as much a feature of business and other professions as ourselves. But it does suggest that we need to reassess roles and the work force. We will need to realign staff effort into growth areas such as portal development and web support and at the same time re-address the centrality of other functions (why have not we all yet outsourced our technical services), and look for a new skills set to meet these new challenges. We will need to form new alliances and partnerships – with pedagogic experts, with document managers, with publishers and other information businesses. It suggests librarians will need to be even more skilled than ever and keep on being reskilled as the technology changes – the Web will not last forever. It suggests a leaner, meaner workforce which is well paid and occupying the high ground of knowledge transfer, leaving the mundane and routine jobs to contractors or to be automated out of the system.

If we are looking for word 'bites' to summarise where we are heading they are:

- Libraries will become functions rather than places.
- Libraries will become user focussed rather than collection centred.
- Information will become cheap, but of questionable quality.
- Users will be more distributed, yet we will need to know more about them.
- Libraries will add value to information to provide more appropriate resources.
- The core processes of organising information will diversify into creating user focussed, personalised systems addressing all kinds of information.
- Libraries will comprise a mixture of professionals with changing boundaries and alliances.
- Routine work will be shed in the pursuit of improving the student experience.

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Digital Dilemmas: electronic challenges for the scientific journal publisher[1]

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Excited by what has now become possible, participants in the creation of the new digital library often overlook fundamental (often implicit) aspects of the paper paradigm that still need to be maintained in the digital universe. In the realm of scholarly and scientific communication, the issues of first publication, version control, referencing, stable and immutable archives, as well as strategic issues blurring the distinctions between the information players all have to be reconsidered. These matters are reviewed with an indication of what has and has yet to be achieved.

We are in the midst of the third great cultural revolution of humankind, the move to a digital environment for all information. Living through a revolution is never pleasant; things can change in unpredictable and catastrophic ways. For those that work in the information industries, never has the traditional Chinese curse 'May you live in interesting times!' been more appropriate.

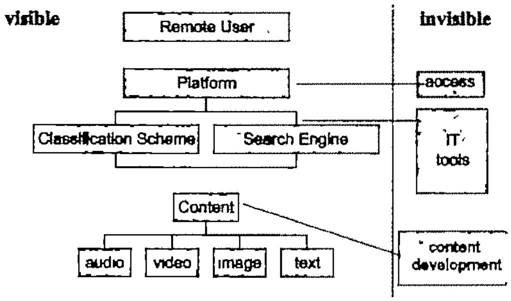
Much has been written about the advantages of digital libraries. Less common has been an examination of what such a change would mean for particular segments of the information world. This paper is an attempt to review the broad issues that surround the creation of digital libraries of learned or scholarly journals.

A schematic structure for a generic digital library is illustrated in Figure 1. This structure shows the user-visible elements as well as the user-invisible modules that are required. The digital library vision is for a single, continuously available, interoperable platform. Work on the generic expectations of its potential users (readers) suggest they want (*inter alia*):

- a one-stop-shop platform that is interoperable, accessible remotely for 24 hours a day and 7 days per week;
- information that is interconnected, for example by reference linking;
- a system that allows easy searching and browsing, possessing downloadable and printable files;
- multimedia applications;
- an application that is free at the point of use.

Trying to achieve these stringent demands in the context of the other players in the information chain is the challenge facing information professionals. The dilemmas that arise in trying to achieve this for the learned journal marketplace form the basis of this paper.

Figure 1. *Schematic generalised digital library*



STM journals: a special case

What are they and who uses them?

Scientific, technical and medical (STM) journals are quite distinct from other types of serial publications, such as magazines and newspapers. They have often been described as the 'the minutes of science'[1], a metaphor which reflects their principal formal role. They

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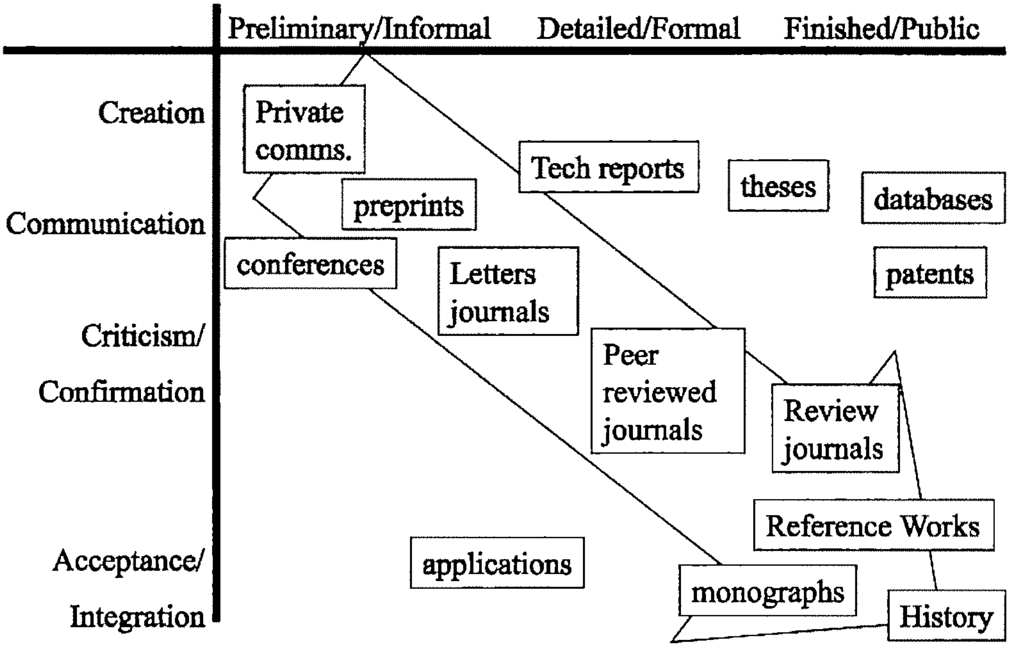
[1] Revised version of a paper originally presented at the DELOS Workshop, Pisa, November 1999

Figure 2. *Science communication and the rhetorical flow*



are not 'scientific newspapers'[2], the news function in science has usually occurred through informal communication within each scholarly community via conferences, meetings, telephone conversations and (especially in physics) via the circulation of draft versions of papers before publication, called pre-prints. STM journals are principally formal records of research that has been methodologically checked by the research community, through the process of peer review. They are also the main instruments in the rhetorical process of science by which the observations of individual scientists are given weight, turning their observations into objective and universal results, which become the building blocks of accepted theories. The rhetorical position of the journal, in the context of other communication vehicles, is shown in Figure 2. STM journals are mainly used by researchers in academia and industry. They use them as authors and as readers and, for most research journals, the set of authors and the set of readers strongly overlaps.

What do they do? [2, 3, 4]

The primary function of the research journal is registration. That is, it registers authors' research claims by providing an independent mechanism that connects an observation to an author and to a date of acceptance In so doing they establish priority of the published author over other competing unpublished authors. Authors are also seeking to place their claims in the best possible journal: (a) to give the highest level of validation to the research, and (b) thereby maximally rewarding the authors' research (and the author). Thirdly, they communicate the results to the readership of the journal. The title of the journal acts as a branding mechanism, identifying the content, approach and likely quality of its papers. In doing so, it selects a tightly defined market of readers from a larger potential pool and disseminates results directly to them. Lastly, as a formal record of validated research it preserves (archives) the investigation and its results for the scientific record. It is immediately apparent that the journal is principally set up to serve the needs of authors and that these may not represent the same desires of those researchers when they are in reader mode. It is from this contradiction, heightened by the move to digital delivery, that a series of dilemmas flow for the scientific journal publisher.

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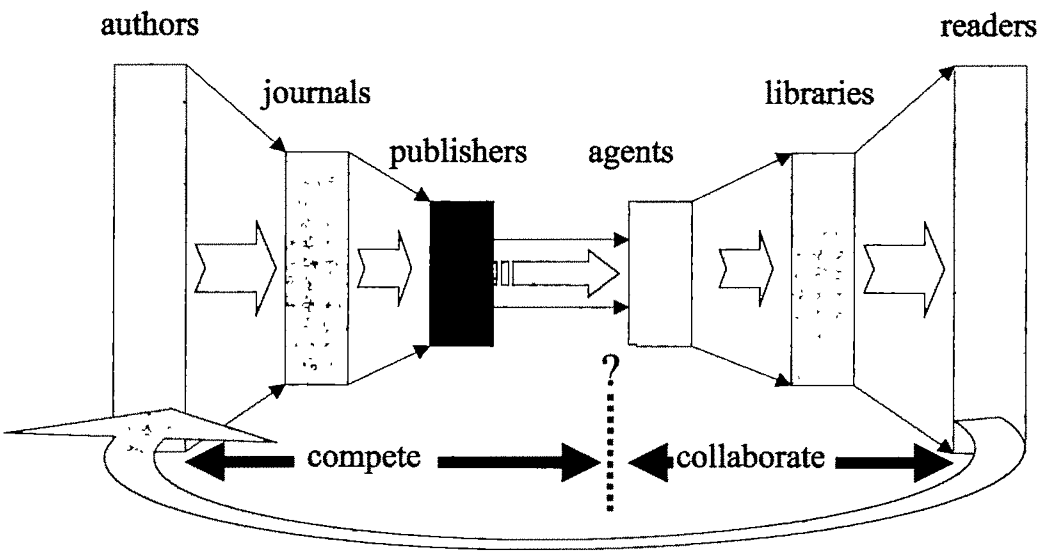
[2] All research level serial publications are loosely called 'journals' even though some of them are clearly intended to be specialist magazines for disciplines or professions (e.g, *The Lancet* or *British Medical Journal*) as well as publishing primary research. Such specialist magazines or professional journals have very large readerships, most of which are neither potential authors nor researchers This makes for a very different type of information vehicle, one driven by reader needs rather than author needs, which affects both its editorial policy and business model.

The strategic dilemma

The essence of the strategic dilemma is represented in Figure 3. Authors compete with each other to get their research accepted by the right (*one* particular) journal. Publishers compete to provide the right journal for top authors Most journals are sold to libraries via subscription agents. These agents compete with each other to supply the widest range of journals, and partly collaborate, partly compete with the publishers. Libraries, on the other hand, collaborate with each other to satisfy readers in their desire to be able to access *all* important journals. For most research journals, the authors and the readers are nearly identical, but their behaviour in author mode and reader mode is radically d ferent. In the former, they focus on a few ke journals, in the latter on a wide range of releva titles. This poses a number of major questions f the players in the system· Where does compe tion stop and collaboration begin? Whom do one satisfy first? How can this conflict be ove come?

For the publishers, satisfaction of autho precedes but does not negate satisfying reader not least because without any authors the cannot be a publication. Each publisher w strive to create journals that attract as many the best authors as possible. At the same tim to satisfy readers' requirements, each publish will try to provide a range of titles covering th areas of interest of each reader community Th introduction of a digital universe has heighten the dilemmas. The growth in electronic pla forms provided by publishers for their own an sometimes other publishers' journals has begu to blur the distinctions between the competiti role of publishers and the collaborative role the agents. The publishers seem to be expandir their role to encompass that of the tradition agent, while the agent is starting to take c some of the functions of the publisher. Th

Figure 3 *The strategic dilemma*



increasing importance of the overall collection and the platform upon which it is made available has made some observers (wrongly) believe that the individual journal no longer has any significance.

For the librarian the broad needs of the reader are paramount. They want to acquire the necessary titles, but they do not want to have to deal with a multitude of publishers. In the paper world they have dealt with a small number of subscription agents, but in the electronic world they (and their readers) would prefer one source and one platform to learn how to use. As customers, they want one source, but they do not want one supplier! This has led some to collaborate over resource sharing and attempting to set up their own platforms. It has also led to the development of the agent's role. The agents increasingly see themselves as the honest broker, creating multi-publisher journal aggregations for the libraries.

The content dilemmas

What readers want versus what authors provide

A similar set of contradictions arises in considering the electronic expectations of readers in the light of what these same individuals are prepared to supply as authors For paper publication, most authors rarely supply more than minimal flat text and diagrams, often not following the notes for authors and frequently of substandard reproduction quality. This problem is amplified when material is submitted electronically, with conversion between different operating systems and programmes causing chaos with special characters and symbols. Circumventing these difficulties has always been the major production role of the publisher in creating quality finished content from that which was submitted. In addition, the task of enhancing the text with links, both internal to the article and external, providing computer-aided indexing and classifications, are also left to the publisher.

When we move from simple electronic versions of flat text and diagrams to multimedia presentation, the problems become more acute. In the first place, it is still rare for authors to submit any multimedia [5]. Those that do usually have some multimedia creation as part of their normal research workflow, such as surgical researchers videotaping operations or theoreticians or modellers using computer simulations or animations. The amount of effort even these authors are prepared to expend on multimedia efforts is limited, however. For most authors, it is the 'fact' of being published that is important, not the 'act'. Rewards are gained from publishing good articles in the best journals, not for preparation of sophisticated reader aids.

If readers say they want any of the above electronic enhancements, but authors do not supply them, what should be done? Research into the wants of electronic readers are bedevilled with the problems of users saying they want something, but not actually using it in practice [5]. Even given that they really do want to see multimedia, is it feasible for anyone other than the author to make up the difference? Can the cost of doing this be recovered by charging for extra value? The experience of the first CD-ROM book producers suggests not[3] [6]. The general public was unwilling to pay much more for extra functionality over the basic content price of the paper product. Where this leaves the STM journal is unclear, but the old mantra 'content is king' still seems a wise one.

The archive and the back catalogue

The move to digital unpacks a number of previously inseparable items. The traditional journal issue delivered the 'browser', the content and the archive mechanism in a single entity. Electronic libraries are faced with providing their own hardware and browser, and purchasing access to content. Purchasing hardware is an additional, cyclical cost since technology and software developments necessitate roughly triennial upgrading. Questions over who performs the archival function and how it should be accomplished remain unanswered It has not been a core competence of publishers, but it may become so in the future. Unlike a paper archive, the electronic one will almost certainly have to be regularly migrated from old to newly developed storage technologies with increasing regularity. The experience of the recording industry shows how over barely a century the archive has had to move from wax cylinders, to 78s, to mono LP, to stereo, to CD, to DAT, MiniDisc, DVD and now MP3. We cannot expect the future of journal archiving in the digital era to be very different. In addition, every migration will have consequences for the rich interlinking envisaged by most providers. The links will need refreshing and checking even when the technology does not change.

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[3] The UK publisher Dorling Kindersley clearly thought that the added-value of the CD-ROM versions of its mass market reference works and guidebooks could be reflected in a premium price over the basic content. The failure of CD-ROM sales to match expectations together with other problems led last year to DK's acquisition by Pearson (See reference[6])

Demands are already arising concerning the digitization of the backlist. How feasible is this, given that there are an estimated 29 million articles in existence since the commencement of journal publishing in 1665, and that this total is doubling every 20 years? Digitization of the backlist and maintaining the archive are tasks with significant cost implications. Whoever has the archival task, how will they charge for it? Who will pay for it?

The meta-content dilemmas

In addition to these content-related issues, there are a number of information management aspects unique to the scholarly journal that are affected by the move to the digital domain. What constitutes first publication? Which version of a digital publication is the definitive version for the archive? How can readers' desires for interconnection be delivered? How will citations be managed in a nonpaper environment?

First publication and definitive copy

Priority protection is a key deliverable for authors using the journal system. The drive to improve speed so that authors can win priority races has led many journals to publish their electronic versions up to one or two months in advance of print. Such speed is often at the expense of accuracy. Errors that occur in the first electronic version are often corrected in the print version. Equally, additional (non-printable) elements may be present in the electronic version but not in the print edition: For the purposes of the 'minutes of science', it is extremely important to establish which really is the final, archival edition. At present, there is no agreement on this, but current practice tends to favour paper. It is unclear how long this situation can (or should) continue.

The waters are muddied further in those disciplines where preprints (early draft versions of articles informally circulated for comment within the research community) have been common. The circulation of electronic versions of preprints, which later find their way into the formal journal literature, and their collection into web-accessible databases has begun to blur the traditional definition of first publication: first appearance in public. Is the date of publication the date of submission of the preprint to the preprint database? Or is it the date when it was received as a 'manuscript' at the journal editorial office? To what extent are the preprint and the final paper the same work? The scholarly community itself has no universal answer to these problems. There is, however, some agreement in some quarters.

First public appearance (whether in paper or online) of a peer reviewed paper is becoming accepted as the point at which first formal publication has occurred. For many, only the first appearance of an accepted, peer-reviewed paper counts. This has recently become the policy of Academic Press and John Wiley and Sons among others. However, there is no consensus about whether appearance as a preprint (electronic or paper) can be used to claim priority. Some journal editors view the preprint culture as pernicious and dangerous (especially in the clinical sciences). Others are concerned that the clear boundaries between formal and informal communication are being blurred. After all, in those disciplines where preprint circulation is common, the principal role of the preprint is to advertise the author's forthcoming paper and to circulate it for informal comment. Informal responses were encouraged, not least to improve the quality of the draft paper before its eventual formal submission to a journal. In this respect, the preprint was functioning in a similar way to a conference presentation. Both form part of the grey literature, and it is legitimate to question why one would want to archive such materials when their informal function was past. The fear of many academics is that the spread of an archived preprint culture will create yet another layer to read when there is much too much already.

Pointers

The desire of readers to have the ability to move seamlessly from article to article via their citation links generates further complications. Universal reference linking requires unique identifiers for each article, in the same way that the ISBN uniquely identifies each published book. A first pass at this was the creation of the Publisher Item Identifier (PII) and related reference numbering, such as SICI. The PII, which is widely used by a number of large journal publishers, is formed from a number of elements: a prefix S (for 'serial', allowing also 'B' for 'book'); the International Standard Serial Number (ISSN) of the journal; a unique item number for the article in question; a computer generated check digit. The main flaw with this system is its adherence to the notion of paper as the primary and sole catalogue-able source. How is the same article in CD-ROM, online, etc. manifestations to be differentiated? The answer lies in the growing acceptance of a single protocol for numbering every potential instance of a work, not just in traditional publishing, but software, audio and video too: the DOI or digital object identifier [7].

The DOI avoids the problems of other numbering systems by disentangling the work itself from its potentially multiple manifestations. Thus, a Beethoven symphony can be given a unique number, representing the original creation of the composer, which is differentiated by further numbers indicating whether it is appearing as a musical score, a recording, a video etc. Not only is the system media-independent but it also provides a ready means to track rights-holders.

References and citation

Even if the DOI or some other system is used, the question remains as to whether authors will use these 'random numbers' in place of the traditional and (relatively) transparent citation system of author/date/journal/volume/issue/page. As with the current experience of authors and multimedia, it seems unlikely that authors will abandon traditional citations. They will require someone else (probably the publisher) to convert the alphanumeric citation string to the DOI (or whatever) that allows pointing and reference in cyberspace. This is an additional task not present in the paper world: it presupposes that there will be a universal numbering system; and that its owners (such as the DOI Foundation) have set up a global database for the purpose. It will clearly cause problems for citation counters, such as ISI, who are currently faced with several streams of citations for each medium manifestation of the article. The data capture and processing of multiple streams of citation data for every single article appear daunting, to say the least.

STM community response

The response of the community of STM publishers has been mixed. Both the publishers and the subscription agents, responding to the strategic issues of the digital transition, have moved to create aggregations of journals and related services: the frequently touted but rarely delivered one-stop-shop. The essence of each of these platforms is a set of journals covering many subject areas with browsing, searching and printing facilities. Some of the publishers and subscription agents have developed platforms with multiple publisher material, cross-linking of articles and entry points to wider, secondary service abstracting and indexing layers.

Elsevier's ScienceDirect™ is a good example of this approach [8]. This platform contains a significant and growing proportion of the world's scholarly, scientific, technical and medical literature. Many other publishers have mounted their journals on the platform, and other parties are in negotiation to join. ScienceDirect™ provides its users with linkage between references and other articles in its database of full-text articles (presented in both html and pdf formats) and extensive abstracting and indexing layers, found in no other platform These in their turn allow searching and navigation to the wider universe of non-ScienceDirect™ material. Publishers Academic, Wiley and Springer have created platforms for their journals, but these lack the rich layer of secondary services found on ScienceDirect™.

While the archiving issue remains unresolved from the technical perspective, there is a growing realisation that academic authors and readers will need reassurance about the permanence of the systems in which their articles reside. Elsevier recently announced [9] that it would commit to maintaining an archive of all its published materials for as long as it remained in existence. In the event of it being unable to do so, it would hand over its archive to competent authorities to ensure its continued existence.

At the 1999 Frankfurt Bookfair a number of the major STM players announced [10] a reciprocal linking policy that would allow readers to navigate links between their respective electronic holdings. Called the CrossRef project, this initiative now has most of the key journal publishers involved and looks to be moving towards satisfying one of the great dissatisfactions of users of electronic journals. It will not, of course, cure the problem of the lack of backfile material in the collective database, which barely goes back to 1996. Although this issue will largely cure itself as time moves on (assuming that 1996 material remains available), for many disciplines the size of backfile desired is comparatively large. In mathematics, for example, references decades or centuries old are not uncommon. In chemistry, several decades of material would be required. According to recent studies, on average, 15% of readings are to material over six years old, 6% to material over ten years old [11].

In tandem with the CrossRef project support for DOI as a unique identifier system is growing, and this at least shows signs of facilitating some of the functionality readers say they want.

Outstanding issues

Although tremendous advances have been made in the last few years (and things have been changing so fast that we often forget that the World Wide Web has only just celebrated its tenth birthday), many issues remain unresolved. The extent to which the current technologies have been embraced varies widely Adoption rates differ both by discipline and by geographic region. Some observers are concerned that, although most of the scholarly community worldwide has access in some form or other to email and (less commonly) the Internet, the distance between the leading edge software and hardware and the most backward implementations is growing.

It is still unclear how digital archiving should be implemented and, more crucially who should do it. As we saw above, archiving of richly interlinked material is not a static business, it requires constant intervention. We also saw that the desires of readers for extension of the digital backlist are not without considerable problems as to the extent to which this needs to done. In both cases, a feasible business model is lacking which would enable the archival function to be performed and render the digitization of the backfile economic.

Perhaps the most thorny of the unresolved issues lies with what counts as first publication Although this falls outside of the control of digital librarians and publishers into the domain of the academic world, the choice of one convention over another could have quite alarming effects for the other players in the information chain.

This paper began with a Chinese curse, so it is appropriate it should end in a similar vein. Looking over what has been achieved and what remains to be done we can at least take comfort in Chairman Mao Zedong's aphorism 'Every journey begins with the first step'. We have only just taken that first step.

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The shifting terminologies of information[1]

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At the heart of any discussion of the information sciences, at least when this discussion is held in the English language, lies the problem of the variant, and shifting, set of concepts and meanings of the terms 'library' and 'information'. The term 'information', in particular, has a variety of meanings in different contexts and communities of discourse, providing an excellent example of Wittgenstein's 'language game'. This implies that any terminology built around this central concept is in danger of being constructed on 'shifting sands'.

This article outlines, for the English language only, some of these diverse meanings of information, and their consequences for the terminology of the information sciences. It focuses on the variant relationships between information and related concepts, particularly data and knowledge. It also includes an account of the view of information taken in the hard and soft methodologies of systems science, as well as the new discipline of 'information physics'.

From this, some remarks may be made on the changing meanings of complex terms such as 'information technology' and 'information literacy', as well as those complex terms involving 'management', information management, knowledge management, document management etc.

A similar, though shorter, treatment will be given to terminology around the 'library' concept, particularly in view of the change toward viewing a library as an organised virtual information space, rather than a physical environment.

Introduction

The word 'information' is arguably the most over-used, and poorly understood, English-language term of the present time. With the advent of the 'information age', the 'information economy' and the 'information society', and with the 'information content' of human beings themselves revealed by the human genome project, the ubiquity of information is undeniable.

Along with this ubiquity, however, has come such a variety in usage and meaning of the term 'information', that it is impossible to immediately grasp what is meant in any particular context. As Liebenau and Backhouse [1, p. 1] put it:

> Information is in some ways an unfortunate term because it has come to mean a myriad of things.. Numerous definitions have been proposed for the term 'information', and most of them serve well the narrow interests of those defining it.

This variety of meanings and contexts for a single term is an example of what the philosopher Wittgenstein [2] termed a 'language game', in which the meaning of any term is given by the way in which it is used, rather than by any generally accepted definition. Multiple uses imply multiple meanings. Gilligan [3] has drawn attention to the way in which the usage of 'information', and similar terms, may be seen as an example of such language games.

This poses particular problems for any attempt to systematise the terminology of library and information science. Although such language games may be seen in the terminology of any subject areas, particularly those that do not have systematised nomenclatures and notations, the problem is particularly severe in this case, since the term is at the centre of any discussion of the subject.

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[1] Based on a presentation *'Information' and 'library' shifting centres of terminology*, given at an international conference on Dictionaries of Library Terminology, Ljibljana, Slovenia, 28-29 September, 2000

The meanings of 'information'

'Information', from the Latin *infomare*, was used in English from at least the 14th century, but gained its current spelling only in the 16th century. The *Oxford English Dictionary*[2] gives several examples:

> Here is I-write but fyve bookes com down from heven for the informacioun of mankind.
> [Trevisa, *Rolls VI*, **1387**]

> A tale which is evident
> Of trouth in commendacion
> Toward their enformacion
> [Gower, **1390**]

> This I have by credible informacion learned
> [T More, **1513**]

The term came to have a straightforward meaning, which is still generally that quoted in English dictionaries: news, intelligence and the communication of facts. Since then, however, the term has broadened dramatically in usage, and hence, in meaning. One way in which this has happened is that the term 'information' has been shown, in several ways, to subsume a number of aspects. Three of these will be mentioned, purely for example:

- From a semiotic viewpoint, information, or more strictly any communication of information, can be seen to have four distinct aspects: empiric, dealing with technical and physical aspects; syntactic, dealing with grammar and language; semantic, dealing with meaning; and pragmatic, dealing with context, use and consequence (see, for example, Libenau and Backhouse [1]).
- Following Polanyi, a distinction is frequently made between personal/tacit information and public/explicit information; this has been given practical importance in the burgeoning field of knowledge management.
- Popper's concept of three worlds may also be applied to the information domain: World I of physical objects, including books, journals, etc ; World II of mental states, including personalised information; World III of objective knowledge or communicable information.

These, and other, subdivisions of the information concept have made terminology more confused, since the simple term 'information' may be, and often is, used as a qualification to imply one of these. Another, and more important, reason why the meanings of information have become so diverse is that the term is increasingly being applied outside its original domain, into quite diverse subject areas, particularly in the sciences.

'Information' in the physical and biological sciences

The first significant usage of the information term in this way came with Shannon's 'information theory', dealing with the mathematical analysis of the efficiency of codings for communication systems In truth, this was simply an unfortunate use of the term - 'signalling theory' would have been more appropriate - which has caused some confusion ever since.

However, one unexpected result of Shannon's work was the application of his methods, and by implication the explicit introduction of information concepts, into the core of science: physical science through the work of Brillouin [4], biological science through that of Gatlin [5].

These pioneering studies led the way for further work, such that now 'information physics' is a subject of considerable interest. Information is viewed here as a fundamental factor within the physical universe, analogous to energy, matter, space and time, such that fundamental physical laws may be rewritten in terms of information (see, for example, Leff and Rex [6], Stonier [7], Grandy [8] and Skyttner [9]).

In the biological sciences, there is an increasing interest, particularly associated with the human genome project, in information as a fundamental biological property, referring to the information content, again measured in statistical information theory terms, of the genome. This has led to information becoming a central concept of yet another subject area, that of theoretical biology (see, for example, Yockey [10] and Schneider [11]).

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[2] All quotations on early usage of terms are taken from the *Complete Oxford English Dictionary*, CD-ROM edition

Information, data and knowledge

There are very many definitions of the term 'information' – Checkland and Holwell [12], for example, quote examples from a list of 50 such Many of these definitions, or explanations, involve the relation of information to the related concepts of 'data', 'knowledge' and (sometimes) 'wisdom'.

The term 'knowledge' appeared first in Northern English writings in around 1300, but not in Southern England until the late 1300s. Its most common usage, as the antithesis of ignorance, appears in an aphorism of Earl Rivers in his *Dictes 12*, printed by Caxton in 1477: 'Knowledge is better than ignoraunce'.

'Data', by contrast, did not appear until the 16th century:

> From all this heap of data it would not follow that it was necessary.
> [Hammond, *Works*, **1646**]

The relation between these different aspects of information for so they have been commonly regarded seems to have been thought about for a long while.

> Out of what data arises the knowledge
> [T. Hale, Acc. *New Inventions*, page 128, **1691**]

> Knowledge is proud that he has learned so much; wisdom is humble that he knows no more.
> [Cowper, *Task VI*, page 96, **1784**]

> With Dante wisdom is the generalisation from many several knowledges of small account by themselves.
> [Lowell, *Works IV*, page 184, **1872**]

> Locke thus reduces the entire certain knowledge of sensible things that man is capable of to one's present data of sense, and one's memory of past data.
> [A.C. Fraser, *Locke*, page 186, **1890**]

The modern sense of the transition seems to stem from about 1950, i.e the advent of the computer, and to be sharpened up by about 1970:

> Data processing, in the broadest sense, means the handling of information by arithmetic rules and logic.
> [*Collier's Year Book*, **1956**]

> Data is sometimes contrasted with information which is said to result from the processing of information.
> [A. Chandler et.al., *Dictionary of Computing*, **1970**]

> In administrative data processing, a distinction is sometimes made between data and information by calling raw facts in great quantity 'data' and using the word 'information' for highly concentrated and improved data derived from raw facts.
> [O. Dopping, *Computers and Data Processing*, **1970**]

Perhaps the most commonly quoted relationship between these concepts is that given byT.S Elliot in his poem *Choruses from the Rock*:

> Where is the wisdom we have lost in knowledge
> Where is the knowledge we have lost in information

Elliot's lines remind us of the generally accepted progression between the concepts of wisdom, knowledge and information, to which we may add data. These are conventionally seen as forming a pyramid – or sometimes a simple linear progression – with the broad mass of data at the base being distilled to the peak of wisdom. It is pragmatically accepted that the 'distillation' process involves what are generally termed 'value added' activities: summarising, evaluating, comparing, classifying, etc. Also, moving from data to wisdom is generally seen as setting information within a context, or framework, of existing knowledge.

Checkland and Holwell [12] give a clear account of this viewpoint, adding an additional element, *capta* – those data to which one pays some interest – between data and information. They see the transformation from capta to information as involving the addition of context, and hence meaning, and from information to knowledge as involving the creation of large structures of related information.

There is, however, an alternative way of regarding the inter-relations of these concepts. This regards knowledge as a form of information which can 'exist' only within an individual's mind; to be communicable, it must be made objective and recordable, and this 'objectivised' form is termed information; a clear and concise account is given by Orna and Pettitt [13]. As Orna [14] puts it:

> Knowledge and information are separate but interacting entities, we transform one into another constantly... the transformation of information into knowledge and knowledge into information, forms the basis for all human learning and communication.

There are some similarities between this view and Popper's three-world picture.

Another perspective on the inter-relations between these concepts comes from the field of systems thinking. Systems analysis, as a means of understanding problems and finding solutions, has the concept of information at its core. However, the concept is understood quite differently in the two main alternative approaches, which are usually termed 'hard' and 'soft' systems methodologies. The difference lies in the distinction, or lack of it, made between information and the related concepts noted above

For hard systems proponents, there is no worthwhile distinction between information and data. Thus Date [15], in his classic book on the area, can say

> the terms data and information are treated synonymously in this book. Some writers distinguish between the two ... it seems preferably to make [any distinction] explicit where relevant, instead of relying on a somewhat arbitrary differentiation between two essentially similar terms.

Conversely, for the proponents of the soft systems methodology, information and data are entirely separate, though linked, concepts. The nature of the linkage is summarised by Checkland and Scholes [16] as 'information equals data plus meaning'.

Checkland [17, p. 353] expands on the importance of this, noting that.

> [the] transformation of data into information by the attribution of meaning makes the study of information a very broad and hybrid field

It will therefore be clear that, just as there is no generally agreed definition for information, so there is no generally agreed set of relations between it and other related terms. This has not, of course, prevented many sterile arguments as to what information and knowledge, for example, actually are, and how one is made into the other.

Information: technology, management and literacy

Some of the confusion around the varied meanings of 'information' become even more sharply focused when the term is used in compound phrases: information technology, information literacy, information management, and the like.

The phrase 'information technology' came into wide use in the 1980s. Its apparent significance is clear - the technologies supporting the communication of information - but in fact it always had a much more restricted meaning, being applied only to electronic, digital technologies This restriction is not sensible on common sense grounds. By any understanding, paper and ink, the printing press, and all other physical means of recording information should be counted as information technologies. These technologies have a long history, certainly back to the clay tablets of the Sumerian civilisation, and arguably to Palaeolithic cave paintings. This is an issue of practical, as well as terminological, significance. The definition of information technology as beginning with the digital computer leads to the confident assumption that no intellectual tools for information organisation, or procedures for information handling, predating the computer are of relevance. This is far from the case Not only are there many helpful analogies to be drawn between the information technologies of different periods (see, for example, Bawden and Robinson [18]), but many intellectual tools are of continuing relevance. The renewed interest in classifications, thesauri, and the like for the handling of Internet and intranet information is an example of the latter.

'Information management' is another case in which the meaning of a compound term has been unrealistically restricted by a narrow understanding of information. The term gained currency to refer to the handling of a particular sort of information: formal, structured, and with a clearly defined life cycle. It happens that this sort of information is commonly of importance within commercial and governmental organisations, and is relatively amenable to computer processing, and hence this approach was adopted with enthusiasm. Its limitations, particularly the fact that it excludes much of the most valuable information within an organisation, particularly that which is helpful for creativity and innovation, was only realised slowly [19]. Ironically, the 'solution' to this limitation of information management as generally understood was the 'invention' of another compound concept, the much-hyped 'knowledge management', which claims to deal with a softer and tacit form of information. This has led to long-running, and remarkably sterile, debates as to whether information management and knowledge management are separate concepts, or whether either is a subset of the other. In essence, these debates centre on the relation between information and knowledge; they are further confused by the emergence of concepts (and professional groups, training courses, and so on) relating to particular types of information product – records management, document management, library management, archives management, and the like.

Another compound term, which has been the source of considerable confusion, has been 'information literacy'. Generally taken to mean an ability to make effective use of information in all formats, this phrase has considerable overlap with similar concepts such as digital literacy, computer literacy, library literacy, network literacy [20]. Again, the confusion stems from divergent views as to whether information may be considered apart from the physical media by which it is communicated.

The meanings of 'library'

The term 'library' has also undergone a change, and broadening, in meaning, though not so great as that associated with 'information'. In essence, this is due to the extension of the library concept, from implying a physical location with a physical stock of books, journals etc., to taking the meaning of an organised collection of information resources, partly or wholly digital, and networked. As Borgman [21] puts it:

> the question for the new millennium is not what to do about libraries but, more generally, what to do about access to information.

With this change has come the advent of a variety of new variants on the library theme: in particular, digital, virtual and hybrid libraries. Thus, whereas up until at least 1980, the term 'library' evoked a particular form of physical space, associated with an organised set of physical resources, today the term may cover very different entities (see, for example, Arms [22] for a comprehensive account of these issues, and Bawden and Rowlands [23] for a briefer survey). The various Virtual Libraries on the World Wide Web have little in common with the buildings and organisations taking this nomenclature for the past four thousand years, and yet it may well be that this is what will be most commonly called 'library' in the future. The use of the term library to refer to collections of, *inter alia*, gene sequences, software algorithms, and chemical compounds, is another example of the take-up of terms from the library profession by quite different professional communities.

Conclusions

The terms 'information' and 'library' must necessarily be at the heart of the English-language discussion of the terminology of library and information sciences. But, as discussed above, these terms are among the clearest examples in English of Wittgenstein's language games, their meaning varying greatly, and increasing in diversity, as new communities take an interest in these concepts.

Riesthuis [24] argues that vocabularies of library/information terminology should serve a dual purpose of explanation and also prescription, stating how a term is to be used, as, for example, in a thesaurus for information storage and retrieval. While such prescriptive vocabularies have their place, in a wider context it is very unlikely, in view of the arguments given above, that any definitions of these terms – and no doubt of others – in this subject will be acceptable and stable. It may therefore be best to follow the advice of the philosopher Karl Popper and, realising the sterility of arguments about the meanings of words, explain our understanding of terms, rather then attempting to convince others that our definitions are 'correct':

> One should never get involved in verbal questions or questions of meaning, and never get interested in words... one should never quarrel about words and never get involved in questions of terminology [25]. (See also [26])

In this way, we may make some progress in handling terminology, and in achieving a common understanding, without sinking in the shifting sands of the meanings of information.

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Learning Area Network: information dissemination and online discussion in an education environment: the Capabil-IT-y project

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The development of undergraduate key skills programmes has been a major concern for some years now, recently given added impetus by the Dearing report [1]. This paper discusses the development, implementation and evaluation of web based key skills materials at the University of North London. Take up of these was positively correlated with academic success, although misuse of online discussion fora was evident. Lecturers and students differed markedly in their perception and evaluation of the system. Many of the advantages trumpeted by academics were dismissed by students, who felt that material posted online gave them extra work; represented an abrogation of lecturers' teaching duties and shifted printing costs from the institution to the student. Network and other access problems caused further disenchantment. The paper concludes that more attention needs to be paid both to user needs and attitudes, and to the resource implications of running such a system.

Introduction and literature review

The University of North London (UNL) was one of a consortium of higher education institutions to successfully bid for funding from the Higher Education Funding Council (HEFC) to undertake 'Capabil-IT-y', a major research project looking at the development and use of computer based electronic media to disseminate course work and information for students at undergraduate level. This paper discusses the results of an external evaluation of the Capabil-IT-y project, undertaken as part of an overall evaluative framework being formulated by the consortium team. It focuses on UNL as a case study, and comments on issues in the development of the website and implementation of the programme, its evaluation by students and staff, and ways in which information professionals could have informed the development of the system.

The higher educational establishment has not been slow to exploit the World Wide Web, as is clear from the rise of the web template Web-CT, used for the project by UNL. Murray Goldberg, a lecturer at the University of British Columbia, originally created the product in 1997 to facilitate course preparation and enrich students' learning experiences at his own institution. The need for such a medium was quickly confirmed, with the system now boasting more than 6 million student accounts in 55 countries [2]. However, despite this massive interest, academic research on the use of the Web in a pedagogical context has so far been limited, and much of it 'dominated by enthusiastic studies and accounts' [3], 'hyperbole' [4] or simply 'description(s) of technology implementation' with little regard to the wider issues [5]. Hara and King [3] are particularly concerned that studies do not address human factors such as students' isolation and the loss of personal contact with peers and tutors, or frustrations with technological problems They put this down to a lack of serious qualitative work in the area, and claim that much of what has been undertaken has been by lecturers involved in the teaching [e.g. 6].

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[1] *Capabil-IT-y external evaluator*

Many studies, perhaps understandably, concentrate on pedagogical outcomes. Aberson et al [7], for example, evaluated a web-based, interactive tutorial used to teach statistics. They adopted the traditional intervention and control group methodology to test the academic efficacy of the software, and found that there were no statistically significant differences between the improvement of each group. However, students rated the tutorial as easy to use and understand. The authors conclude that their study provides evidence that an Internet tutorial can be comparable in effectiveness to standard lecture or demonstration techniques. Heines [8] created a number of websites to enhance traditional classroom instruction in computer science courses, and measured outcomes by student questionnaire survey and learning improvement. Although admitting 'a number of uncontrolled variables' affect student performance, the author claimed that 'a statistically significant final grade improvement' occurred after the introduction of the website

Hara and King [3] took a far more holistic approach, and much account of students' views and experiences, rather than a simple academic measure. They undertook a detailed case study of a web based distance learning course at 'a major US university' Observation, interview and 'document review' were undertaken. The observations were of students' interreactions with the computer during online tutorials, and online discussions, interviews focused on student experiences, perceptions and opinions. The documents examined included course syllabus, reading assignments and students' email contributions. The authors found that students did not enjoy these discussions, (one said 'I agree with her, but I am not sure if I should send a message saying 'I agree'... am I contributing enough or not?') They also felt that there was not enough feedback, and there was a lack of technical support to deal with the inevitable network and other problems. Finally, tutor instructions were found by students to be minimal and ambiguous, even following emailed requests for elaboration. The authors conclude by cautioning against uncritical acceptance of computer mediated education and calling for more work which explores the actual experiences of students. This paper addresses these issues, and follows Hara and King in taking a student-centred approach to explore the wider implications of web based learning.

Context of the evaluation design

The overall aim of the research was to assess the impact of Capabil-IT-y on both staff and students, highlighting the nature of its successes and problems, and from these to draw up some tentative recommendations for the further implementation of teaching materials and their evaluation. The evaluation did not seek an objective measure of the performance of the various teaching materials, but to examine opinions, attitudes and experiences. However, some assessment of pedagogical outcomes was possible from internal papers equating materials usage with student success. Data were gathered from in-depth interviews with staff involved in the project and with students undertaking the course. Although these interviews were generally one-to-one, some group interviews were carried out with students, and email correspondence was also used to clarify various points. Meeting minutes and other internal records were consulted for additional information on issues that arose during discussions with project staff.

The Capabil-IT-y project at UNL

The Capabil-IT-y project at UNL is based in the School of Communication, Technology and Mathematical Sciences, and has been implemented on three course modules. This report concentrates on one of these, An Introduction to Statistics for Psychologists. This was because of the availability of students to interview and observe, and because internal evaluation documents all relate to this module. It is one of a large number of modules mediated by the web template WebCT. Components of the module include the teaching of SPSS software for data analysis, although much of the module concerns general issues of statistical measurement in the area, and student discussion and individual research are both important parts of the course. Teaching includes lectures, computer based SPSS problem solving, and seminars.

Students' backgrounds are very diverse, so they have different experiences and expertise in psychology, numeracy and IT and varying communication skills. It is not uncommon for students to complain about the inclusion of IT on their courses. The usual refrain from this group is 'I came here to study psychology, not learn about computers'. However, once the need for quantitative data and the usefulness of statistical packages for analysing it have been established, most students are more positive. This change of view may be partly attributable to the constant efforts of the lecturer involved in trying to relate the subject to current issues to enhance its topicality.

WebCT

The WebCT package was the obvious choice for the course team to work with to produce material for the Capabil-IT-y project. Partly this was because it was already in operation at UNL, having been introduced in 1997 to facilitate a policy of promoting distance learning. The following were developed and uploaded onto the template as part of the 'Capabil-IT-y' project:

- course notes (incorporating appropriate web links), timetable and diary,
- practical exercises (SPSS worksheets, problem solving);
- tutor directed online discussions (i.e. 'Think of an example where statistics could be useful, either from your main area of study or from every day life').

The skills these materials hoped to encourage were those to:

- undertake independent research and learning;
- enhance numeracy to a level that included the ability to manipulate and interpret data (these aims were at a higher level than the basic skills material being developed by other Capabil-IT-y institutions);
- foster 'web literacy' – the ability to seek and find information and critically evaluate it;
- improve interpersonal skills – to engage in online discussions, to help foster the ability to think about issues and participate in group discussions.

Using WebCT

Use of WebCT can be calculated with some accuracy, as web page access is monitored. Thus the team at UNL has set up a system whereby the times WebCT is accessed and the pages consulted are logged for each student. A record is also kept of online discussion group participation. An individual name can be entered as a search term and all messages sent by that person are retrieved.

Results show that 62 students out of 98 (63%) accessed WebCT at some time during the course. However, the mean number of hits was only 29, and the median a mere 8. Considering that each hit is only the retrieval of one HTML page and that, therefore, a number of hits would be expected to come from each session, use may be considered as light. However, one reason for these somewhat disappointing figures is the problems associated with accessing the network, as described later in the ***Technical problems*** section. Figures increased for the second half of the semester.

It was possible to measure if there was any difference in the extent of WebCT usage between those who had facilities to access the network from home and those who did not, and had to rely on access during their university visits. A pre-course questionnaire sought information on home access to the Internet, and findings from this compared to the web logs. Results, from the 79 students who completed the questionnaire, indicate that, perhaps not surprisingly, there was a difference in web usage according to whether students had use of a home computer. Log data showed that approximately the same percentage of students in each group with and without home access used WebCT at some time. However, the former recorded heavier usage, as shown by a median number of hits of 23 hits compared to 8 hits for those without home access [9].

Despite the low WebCT usage recorded, there was nevertheless a positive correlation between students who successively completed the course and extent of online access. Of the successful students, 68% accessed WebCT at some time, against 56% of those who did not successfully complete the module. The mean number of hits was also greater (47 hits) than that of those who did not pass the course (17 hits), and indeed, greater than the mean for the whole student group (29 hits). An analysis of pass rate and home WebCT access was also undertaken. For those with access this was 68% compared with 46% for those without – a significant difference.

These figures provide some evidence that students who succeed used the resources more than those who did not complete the course, and that, therefore, tracking the students should enable those who are not fully engaging to be identified early. However, extent of WebCT use may not necessarily be causally related to student success. Those who are heavy users, for example, may simply be generally more enthusiastic or studious, with the use of WebCT one manifestation of this. Alternatively, users may be the students who have more time to study and are more likely to do well through this.

More qualitative data on student usage of WebCT was accrued from the evaluative fieldwork in the form of in-depth interviews. All 25 students interviewed said they used WebCT, with estimated usage ranging from 'nearly every day' to 'one occasion', with most students indicating usage at around 'once a week', although this was generally said to be 'variable'. The principal use was to access and consult course notes. A complete list of stated uses appears in Table 1.

Table 1: *Use of WebCT*

Activity	**No.**	**(%)**
Accessing lesson notes	16	(64%)
Undertaking practical exercises	9	(36%)
Using Internet links	7	(28%)
Online discussions	2	(8%)

The most popular activity, as can be seen from Table 1, was for accessing lesson notes – checking up, revising, and keeping up with missed lectures. Undertaking practical exercises was the next most popular activity. This included SPSS problems, IT tutorials and self-diagnostic numeracy testing. The figure of 36% mentioning this use was seen as a little disappointing by staff involved in the project – the benefits of the medium were specifically stated as embedding key skills and promoting active learning, both of which the practical exercises were designed to facilitate. A few students saw the system as a gateway to the Internet, and hoped more links to psychology sites would be forthcoming over the course of the year.

Turning to the more interactive element of WebCT, the figure of only two students (8%) specifically mentioning participating in online discussion is interesting, because it does not reflect the figures available from web statistics. These show that 79% of students had participated in these by week five of the semester, when the external evaluation was carried out. It may be that interviewees did not mention this activity because they do not hold it in high regard. Alternatively, whatever its intrinsic worth as a communicating medium, it may not be considered to be part of the course.

It is worth noting that 'only a handful' of students participated in this activity during the previous running of the course [10]. A reluctance to participate was attributed to two factors. Firstly, there was a lack of incentive, because of the then policy of not assessing this element of the course. Secondly, there was some speculation that shyness and reluctance to expose ignorance was another cause.

Both of these factors were removed for the January 2000 cohort. Firstly, the system was set up so that all discussions are 'peer anonymous'. This also had the additional benefit of facilitating 'blind marking' for tutors, although they can, of course, identify students when necessary. Secondly, students are now under an obligation to keep a log of their IT sessions.

Use of the discussion fora can be broken down as shown in Table 2.

Table 2. *Message type breakdown*

Message type	**Frequency**
Task related comments/answers	30 (38.0%)
Questions/responses related to task ('What the hell are we supposed to do?')	13 (16.5%)
Inappropriate contributions (witticisms, nonsense messages etc.)	36 (45.5%)

Task related comments/answers

The low percentage of messages 'on task' was not considered to be too much of a problem by project developers, who accepted a large amount of non-task communication as inevitable. As one lecturer pointed out, many students probably initially get involved in the questions and then indulge in other messaging. Responses to the task of discussing the usefulness of statistics included:

- Being an ecologist it is very important to use statistical methods when comparing populations, predator/prey relationships and numbers of organisms in an area.
- Ecology requires the use of statistics in analysing data collected in the field.

Questions/responses related to task

The 16.5% of messages that can be described as questions mainly concerned the small group discussions being set up. Comments (with original punctuation) include.

- How we going to find out about the groups.
- What are we supposed to be doing in these forums. I have no idea what this is all about? What about you?

Inappropriate contributions

Interestingly, as time went on more and more of the contributions became inappropriate. What appears to have happened is that a minority of individuals started to post nonsense and these messages were answered by others, creating strings of non-task related communications. Even taking into account any predilection to respond to joke messages that might inflate the number, the degree of frivolity encountered on the message board (36% of all contributions) is surprising. It has been made clear to the students both that they are identifiable to staff when necessary, and that their discussions are assessed. It may be that some students feel that making an appropriate and obligatory contribution confers a licence to indulge in personal communication later. Alternatively, the message board system may be seen by some as their only electronic means of contact with their peers beyond one-to-one email, and thus a legitimate medium to use for any information exchange.

One issue that arises here is that of policing or moderating the discussions. Despite the high level of misuse, staff prefer to intervene only to correct misleading information or when systems or institutional regulations (e.g. Equal Opportunities rules) are infringed. It is argued that student discussions evolve rapidly over a semester, a contention that the external evaluator could not explore due to the time constraints of the evaluation. Banter is tolerated at the start, because later, as one lecturer explained, 'students progress to talking about their studies, offering mutual support and generally gaining pedagogically from the system'.

One factor missing from this analysis is the private discussion groups set up. Approximately 26 of these were set up on WebCT for the purpose of group work on particular topics. According to staff, communication in these groups, to which the external evaluator was not given access, has been much more academic in nature. They have worked well and offerings from the groups have been added to the list of 'useful websites' in WebCT.

Evaluation of WebCT

Both staff and students were invited, during in-depth interviews, to evaluate WebCT. They were encouraged to do so on their own terms, and to discuss whatever elements they felt were the most important. Staff were generally very positive, and tended to concentrate on both the educative and practical advantages of the system. Indeed, staff saw only one negative aspect of WebCT. This was the volume of extra work necessitated by the project. Part of this has concerned the production of material to upload onto WebCT. Staff were also worried about their abilities in working with electronic information, and complained that they do not have the time for in-service training. Interestingly, the very recognition of the possibilities for course presentation, interactivity etc. appears to have caused some anxiety amongst those who did not class themselves as technically adept.

Staff were generally very positive regarding both the educative and practical advantages of the system. Students, although discussing the same attributes as the staff (24-

hour access, external links etc) did so from a very different perspective, and were far more negative. The issues raised, and the differing perspectives taken by staff and students will now be discussed.

Greater depth

Far more information can be posted on the Web than was issued on paper. Not only is there scope for an expansion of material provided, but students may not have to scramble for limited books and other paper based materials in the library – 'the paper chase', as one lecturer put it. The advantages, as seen by project developers, of the facility to host an almost limitless amount of information in addition to 'normal' course notes, were appreciated only by a small number of students interviewed. Some (4, or 16%) claimed that staff were neglecting their teaching duties by offloading course material onto the Net that should have been included in their teaching programme. Similarly, many felt that the quantity of obligatory background reading had increased as a result of WebCT. The issue is, of course, one of overload.

More efficient dissemination

Web based materials can, potentially, be disseminated far more easily and quickly than can be the case with hardcopy, and lecturers were very enthusiastic about this. Having course notes online was also considered a good thing by students too, although only six respondents did not qualify their enthusiasm with a caveat about printing costs or computer 'down time'.

Printing from the web

For staff, lecture notes added to WebCT saved the effort of printing two or three hundred sets of lecture notes. Many students, however, raised the issue of the costs incurred in printing from the Web. Indeed, there was even some feeling that the whole purpose of the system was to pass expenses from the institution to the individual. There was a stark contrast between the number of students who made these points (10, or 40%), and those (just 2, or 8%) who gave the University credit for the new technology centre with its hundreds of new computers. This grievance, when put to staff, was seen as a little unfair, who point out that paper has not completely disappeared In lab sessions, paper versions of the practical exercises are still given to those in attendance, although they are on the Web for those who want them.

Twenty four-hour access

Many part-time students work in their own time, often very early or late, and the facility – for those online at home – to access course information and email questions (both to staff and other students) was considered by staff to be invaluable. Surprisingly, only two interviewees were positive about this apparent advantage. By contrast, many students complained about seemingly endemic networking problems that made access, from within or outside the University, impossible on many occasions and for long periods. Even those with access from home, who at least had a better opportunity of logging on, were sceptical of this feature.

Interactivity

Interactive functions clearly helped – or was designed to help – foster the interpersonal skills and the ability to discuss and think about issues that was one of the aims of the project. However, the advantage of being able to host online debates was not a major talking point amongst staff. When prompted they reiterated the aims of Capabil-IT-y, but clearly did not see it as an element in the system. Only a minority of students mentioned this feature too. Four (16%) students were enthusiastic, although one of these gave what might be considered inappropriate reasons – from a pedagogical point of view – simply stating it was easier to keep in touch with 'mates' and provided a welcome distraction from work related computer activities. When asked if he involved himself in the formal online discussions he said, smiling, that he had not 'got round to that bit of the course'. Negative comments were fewer (2 or 3%), presumably because the activity did not affect those declining to participate. Both were on the lines that there was little point in committing opinions to writing, as the issues were discussed anyway orally in seminar sessions.

Two other aspects of the project were only commented upon by the staff. These concerned pedagogical issues of interest to educators. 'Skills transfer' was seen as an important part of the project, with one lecturer enthusing' 'it enables embedding of a much wider range of activities so the students are transferring skills learned in one kind of activity/tool/resource to others'. Similarly, the monitoring facility contained in WebCT was highly regarded. Having access to WebCT logs means that student activity is visible to their tutor, so 'it's exposing and recording their progress'. A lack of progress can be picked up easily, therefore, and remedial action taken at an early stage

Other issues and problems

Technical problems

One very big issue to arise concerned the numerous technical problems experienced, many of which related to preparation for opening the new 'Technology Tower' in February 2000. 'Teething troubles' for over a month resulted in a high proportion of students being unable to access the Web, restricting the range of activities available and resulting in low take-up of WebCT.

The project team was at the mercy of the university technical support department. This was because there was no allocation from Capabil-IT-y funding at UNL for dedicated technical assistance beyond the employment of a Learning Technician. Her duties were, however, to help develop and upload project materials, not to solve networking problems or debug software. Quite apart from the time constraints, such problems were also outside the field of her expertise. The lack of project dedicated technical support to solve the numerous software and networking problems had serious negative consequences for the project. These included delayed implementation of the system, and student disaffection both at this and at the access problems this created throughout the course.

Materials format

A major issue concerned the question of which application to use Not surprisingly, students tended to save Web pages and/or print them off to read later. Several different formats were tried, but none were found to be ideal because 'students at home have different browsers, word processors, versions etc'. Word was considered the most universally used application, and having Portable Document Format (PDF) files also made sense because of its transferability across platforms. Nevertheless, problems still arose because word-processed documents converted into PDF often looked messy, with poor spacing and incorrect formatting.

Using both formats, in an attempt to cater for all students, created its own problems. Some did not realise that material was duplicated, and felt they had to struggle with both applications. Similarly, there was confusion between students who compared notes, because printouts of Word documents were different in appearance to the PDF files Some students thus believed they did not have the correct material. To make matters worse, other staff use alternative formats. One lecturer (whom students progress to following the Statistics for Psychologists unit) puts his notes in RTF format.

Using WebCT with the disabled

The adaptability of WebCT for disabled users is a big question that is currently being addressed by the project team who have been given further funding to explore the issue. One example of the attempts to accommodate those with special needs has been the formatting of documents with specific regard to dyslexic students. Various attempts have been made to adjust these (by, for example, double-spacing) to facilitate greater understanding by this user group, who found instructions difficult to follow on screen There is recognition that much more needs to be done to make all the materials usable by all disabled groups.

Staff training

This is considered to be an important issue with the project team. The Learning Technician post funding expired in July 2000, and so other staff now require instruction in order to maintain the system. This would include web authoring, managing PDF files, and how to set up and manage online discussion groups. More technical skills would also be useful to solve software problems and thus avoid the delays accrued in waiting for support staff who are already overloaded with other work. Training is offered to staff at HEAD (Centre for Higher Education Access Development), but the training needs outlined above seem unlikely to be satisfied, principally because staff are working under very severe time constraints. The project co-ordinator foresees big problems for the future of the project Indeed, the time element may even affect working with the administrative element of the programme. First year students number over 400, and so even data input for a group this size implies many hours of work.

Transferability of materials

One key issue in the evaluation of the project is the transferability of the materials to other modules and other disciplines. Staff suggested that the material used has very wide applicability beyond the courses for which they were originally designed. Indeed, the lecturer who runs courses with a Capabil-IT-y input has already applied some of the materials to new areas, and stated that other members of the teaching staff are also interested in using them. Students are learning through Capabil-IT-y such universally applicable skills as using a word-processor and retrieving information from the World Wide Web. Even specialist skills such as data analysis and data 'cleaning' have applications beyond that of psychology or even the social sciences. One problem, however, in the wider use of the material may be that of copyright. Much of the practical exercises on Web-CT concern the use of SPSS. It is possible that the company producing this package could demand a licence fee for its use in training materials, a problem that has already occurred at the university.

Conclusion

The functionality or accessibility of the system was one key issue to emerge from this study. Dedicated technical support would clearly have made a huge difference to the smooth running of the system and the benefits accrued from its exploitation. Perhaps even more important was the clear message that those developing materials for use in an electronic (or any other) environment need to pay more attention to user needs beyond those associated with the pedagogy of the subject. This implies a careful consideration of, for example, the value of extended course notes and the ability (or inclination) of students to either absorb additional information or undertake what may be difficult data manipulation exercises in their own time. The Web can be a marvellous medium for information dissemination and interactivity, but it can only facilitate true learning if it genuinely meets the needs of those for whom it is employed.

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SPECIAL ISSUE

Aslib Proceedings

New information perspectives

The Internet Studies Research Group (ISRG)

The global digital divide; beyond hICTeria
Michel J. Menou

Creative charades: playing with music, films and books (this article depends much on lawyers)
Robin Hunt

The convergence of convergence
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Health kiosk use: a national comparative study
David Nicholas, Paul Huntington and Peter Williams

Mildly irritating: a WAP usability study
Marc Ramsay

Aslib imi
INFORMATION MANAGEMENT

Aslib Proceedings is a long-standing professional journal of international repute, which has a large and wide subscriber base. The journal brings currency, authority and accessibility to the reporting of current research, issues and debates in the broad area of information work. Above all the journal wishes to provide research and comment in a form that is easily and quickly understood: a fresh, rigorous, but unfussy, writing style is what is aimed for. The needs of busy practitioners (and academics) are very much in mind. Articles are refereed to meet the need for accredited and authoritative information. To ensure that this does not result in an unacceptable loss of currency, articles are speedily refereed by the journal's large, eminent and multi-disciplinary Editorial Board (assembled for just such a purpose). In some cases they may be referred to an external panel of consultants. The journal's monthly publishing pattern helps in maintaining the currency of reporting. In consequence the submission of research in progress articles is encouraged.

The boundaries of information work are rapidly changing and widening. *Aslib Proceedings* has a role to play in the repositioning of the information profession by encouraging submissions from information managers, provides, packagers and consumers of all kinds – and especially those from the related fields of journalism, electronic publishing, communication and Internet studies. An interdisciplinary Editorial Board has been assembled to assist in the process.

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The Internet Studies Research Group (ISRG)

This special issue of Aslib Proceedings is given over to the work and thoughts of the ISRG, which celebrates its third anniversary this year. The ISRG began its life at City University in April 1998. It is a multi-disciplinary association of researchers and practitioners from the related subjects of information science, computer science, journalism and electronic publishing who have combined to provide a comprehensive and all-around understanding of how the Internet is impacting upon industry, government and society. The Internet had blurred discipline boundaries and turned subjects inside out. To research it successfully an interdisciplinary approach is needed. The ISRG provides this.

Organisations other than City University represented in the Group include Independent Digital, *The Guardian*, arehause (a new media consultancy), Sheffield University (Department of Journalism), University of Warsaw, Centre for Policy on Ageing, The Sterling Group (New York) and Newsquest.

In its three-year life ISRG has attracted more than £300K in funds, published more than fifty papers and three books, and run an international conference on the impact of the Internet at Cumberland Lodge, Windsor Park in 1999. Currently the Group is involved in funded research concerning:

- Digital health information provision for the consumer (for the Department of Health and NHS).
- Newspaper web logs (for *The Independent*).
- Developing web content for African countries (for the International Institute for Communication and Development).

There are also seven City University PhD researchers attached to the group, whose work fuels the Group's thinking They conduct research on such topics as: subject gateways on the Web, the Internet in Africa, metadata registries, impact of the Internet on historians, knowledge management, the changing face of university libraries and email.

The ISRG is the only research group of its kind in UK information science and ranks as the subject's premier web log and media information researchers (recognised by generous funding from the Media industry itself). It is rapidly becoming the leading digital health information group through its work for the DoH/NHS (recently winning a prestigious contract to evaluate the NHSDirect digital health services). The construction and implementation of strong evaluatory frameworks are very much a feature of the work of the ISRG. So too is its forward thinking (see Robin Hunt's paper). Professor Menou's work adds a community focus to the work of the Group, especially in regard to the monitoring, evaluation and impact assessment of telecentres and ICT applications in development programmes in developing countries.

Previous work has included the evaluation of the impact of the Internet on information seeking in the media, a web log analysis of *The Times/Sunday Times* website and determining the key factors in the construction and organisation of newspaper websites. ISRG is currently experimenting with linking web log analysis with geographic matching methodologies.

The membership of the Group is as follows.

Professor David Nicholas
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The Internet Studies Research Group (ISRG)

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- Milverton Wallace
  - Managing Director, Net Media
- Paul Simon
  - Managing Director, Isaiah Consulting Ltd
- Marc Ramsey
  - Web producer, BBC
- Maria Monopoli
  - PhD student, City University
- Alfredo Moreno
  - PhD student, City University
- Eti Herman
  - PhD student, City University
- Panayiota Polydoratou
  - PhD student, City University
- Mike Chivhanga
  - PhD student, City University
- Pedro Osoria Silva
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The global digital divide; beyond hICTeria

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Questions the values and wisdom of those proposing to tackle the global digital divide Why, for instance, the concern for the digital divide and not the health divide? Questions too the methods for determining and measuring the divide and the naïve assumption that the Internet itself can transform the destinies of the digitally poor. What is really at issue is not finding the best way of bringing the Internet to the poor, but finding the best way for the poor to take advantage of the Internet in order to improve their lot.

'We should bridge the digital divide' seems to have become within a few years the rulers' most trendy political slogan on local, national and international scenes. Its popularity is, as usual, directly connected to the vagueness of its contents and infinite variations of its interpretation At their 2000 summit, the G8 members found in the reduction of the digital divide a convenient palliation to not having kept their previous year's promise about the reduction of the debt of the poorest countries. While the new millennium (according to the Gregorian calendar) was inaugurated with the first World Social Forum in Porto Alegre, Brazil, the Davos World Economic Forum, never short of imagination, invited its participants to discuss ways to bridge the digital divide. The legitimisation for this slogan comes from the reiterated assumption that:

> Information and Communications Technology (IT) is one of the most potent forces in shaping the twenty-first century. Its revolutionary impact affects the way people live, learn and work and the way government interacts with civil society IT is fast becoming a vital engine of growth for the world economy. It is also enabling many enterprising individuals, firms and communities, in all parts of the globe, to address economic and social challenges with greater efficiency and imagination. Enormous opportunities are there to be seized and shared by us all [1].

Even though one cannot question the fact that ICT applications are interfering with, and thus have the potential of transforming, all realms of human endeavour, if not the species itself, the balance between economic and social concerns and relationships between the two is far from clear or simple. One may wonder who is going to seize what opportunities and who is going to share what, assuming all have a share in the returns. It is quite interesting to note, in retrospect, that the warning by Porat and Rubin [2], in their pioneering study of the US information economy, that we should do everything possible to understand the phenomenon in order to avoid its negative effects, contrary to what happened with the industrial revolution, has not really been heard. As stressed by Heeks [3] the dominant mood is what he refers to as an 'ICT fetish' in which technological determinism and positive outcomes are grossly over-estimated. There are, however, a number of opponents who continue to claim that there are far more important needs to be met in the developing world than getting everybody online. What, if accomplished, will this do to cure such problems as endemic diseases, environmental degradation, political instability, etc? Since pros and cons are not less excessive and undiscriminating in their points, we prefer to coin the name 'hICTeria', after hysteria, for this 'new' (everything is new in the contemporary world, especially the oldest facts and ideas) mental state.

So what is the Digital Divide? On the international scene, which is our main concern, it is said to result from the fact that there is a huge and growing gap between the more advanced countries and the others regarding the size and intensity of their ICT applications. Should this trend be left to grow naturally, we would soon live in a dual planet But there have always been many dualities on the planet. Why not bridge the 'healthy life divide' and ensure the better off countries mobilise so those drugs against major diseases and decent sanitary conditions are accessible to everyone? Why not bridge the 'fair working conditions divide' the reduction of which would in practice eradicate slavery after more than one century of its abolition? Many other lasting divides could be pointed to Would perhaps the difference between the latter and the former lie in the fact that a global ICT market can actually be achieved and much less, for instance, a cheap tri-therapy market? Interestingly, the interventionism seems to be far less fashionable when one considers the digital divide on the home or domestic scene. If connectivity is so essential, why is it not free, or at least recognised as a basic human entitlement (which is coming only very slowly), and why is it not taxed at the same rate as staple goods and services? Could it be because the natural growth of the market is taken for granted? These ambiguities are well illustrated when the Chairman of the US Federal Communications Commission equates the notion of digital divide to a 'Mercedes divide' he allegedly suffers from, but which he gets along with [4] An even more vexing ambiguity results from the fact that the existence of the digital divide is basically measured against the percentile of people holding an Internet access account. Other infrastructure related indicators eventually come into the picture, such as line density, network speed, number of domain names, etc. Such measures are a mere reflection of the individual consumption model of 'advanced capitalism'. Whether this 'model' is the only valid and effective one remains to be demonstrated It was pointed out recently that if in China each adult came to have a car it would exhaust the world's oil reserves, not to mention what the resulting increase in pollution would do to the planet. A number of studies have shown that actual users of an Internet account or connected computer, not only in the developing world, may range from a few to several hundreds [5]. The digital divide metrics may indeed refer more to the appetite for new markets rather than equity concerns

It is far more significant, perhaps, that there are questions not raised in the digital divide debate Connected to what? Connected for what? As if the simple fact of being connected in itself brought to bear all possible economic, educational, cultural or social benefits. Cars offer yet another striking example since the 'intelligent car', on which so much R&D funds have been spent, is likely to result in the re-invention of something very close to the train, except for the private cubicles! For years international development cooperation has been built upon the same misconception, or hypocrisy, as colonisation: the more powerful know better. Let us assume for one moment, something that is far from the case, that all the world's information resources, mainly from the 'North', contain appropriate answers to the real life problems most people, who happened to live in the 'South', have, and could be accessed by the latter. There would be, however, no moves to transform all the basic conditions that currently prevent the successful utilisation of this information. The Internet is like the Delphi oracle: it can give the information, it cannot change destiny. It is people with vision, hope, energy, space to move and luck which make the changes. This is not to deny that the Internet is indeed capable of fostering such factors and, especially, opening new spaces. But what should be really at stake is social change and not the marketing of ICTs As Castells pointed out [6]:

> It is the entire social organization that becomes productive or, on the contrary, an obstacle for innovation, and thus for productivity growth.

So what should be central to the debate about the digital divide is not the best way to bring the Internet to the poor, but the best way for the poor to take advantage of the Internet in order to improve their lot The consequence of this premise is, as Hamelink put it [7], that·

> The challenge, in both public and private scenarios, is to place the public interest at the center of policy considerations and to ensure that adequate mechanisms for public accountability exist.

From this perspective it is striking to note that the so-called ICT revolution seems to be surfing on the wave of neo-liberal privatisations No society in history has ever left to the unpredictable or else all too predictable forces of an abstract entity, like 'the market', the responsibility for establishing and managing a strategically critical resource. While public-private partnerships are certainly welcome, and possibly necessary for the development of an 'information society', they can only be fruitful if there is a common vision and commitment. Observing the enthusiasm of the private sector when asked to bring connectivity to remote and low-density rural areas, not to mention high bandwidth, makes one sceptical about its commitment to social goals. Fair enough since its raison d'être is profit In many instances, the natural spokesman for public interest, the State, often seems to have other concerns; it may be appropriate to turn the tables. It is up to the concerned communities to organise themselves and figure out how they can make use of the Internet. In all parts of the world, community networks are expanding and gaining maturity, as witnessed by the Global Community Networks conference held in Barcelona at the end of 2000. Rather than spending considerable amounts of money on governmental or other 'high level' conferences simply to talk about the digital divide, and repeatedly study the phenomenon, one would be better advised to create conditions for these digital efforts to concretise, and provide the necessary support for the networks to take off

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Creative charades: playing with music, films and books (this article depends much on lawyers)

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> Mobile: 'changing easily in expression, mood, purpose'.
> Devices: 'invent from existing principles or ideas'.
>
> Definitions from *Websters Universal Dictionary.*

Hey Mr. DJ put a record on

Of the bounteous bourgeois benefits of the digital era one of the most pleasurable is the opportunity to revisit the past, luxuriate in it; then 'change' it. The plethora of reasonably priced (or expensively repackaged) compact disks now available featuring music created long before Britney was born – long before even Madonna was born – means that we can now enjoy and study music performed in the twentieth century with a depth and specialisation never before possible without a barn-sized home for the vinyl collection, and a magically deft way with the stylus.

Penguin's awesome guides (and subsequent updates) to 'classical' and 'jazz' CDs is the physical reminder of just how much music is out there So too the monster record stores such as Tower or HMV; the myriad of more specialist online music sites. But in these replicating, Napster-downloading days, the digital domain has brought about another opportunity: the chance to easily 'sample' music. That is to explore music not merely by 'listening' to it via loudspeakers or headphones. There is a second kind of sampling which is about watching music's patterns on a screen, about 'cutting and pasting' its elements, perhaps a bass-line, perhaps a vocal track, or a smart piece of orchestration for strings, and then utilising this sound in a new way as part of a different piece of music. This is the basis of Hip Hop, and that pioneering music's legacy is felt pretty much everywhere in contemporary music short of Shostakovich these days.

Now look at the home computer Improved music-making technology on the PC goes hand in hand with what could be called the 'Blair Witch' phenomenon using advanced technology to drastically reduce the costs of creative projects, some day maybe even bringing them down to next to nothing.

> High-tech becomes low-tech. With the right software (some of it free off the Internet), composers of the future won't need a big wad of cash to develop a project. Their home computer, equipped with a built-in CD burner and software for MP3 conversion, sequencing and sampling functions, will still cost less than any decent electric guitar, synthesizer or drum set — let alone a Stradivarius violin or a Bösendorfer piano [1].

As I am writing, for example, I am listening to a fairly recent Janet Jackson song which features Joni Mitchell's vocal from *Big Yellow Taxi*, first sung in 1968. In fact I am listening to four versions of this 'song', this patchwork, each given a different mood by 'producers' working with the original pair of vocals: Janet and Joni's. I can, should I choose, watch the patterns of these versions and 'snatch' my own sample for a further creative act – as the artists Braque or Picasso did ninety years ago in their salad patchwork days and the Puff Daddy does now Or I could look up reviews of these songs online; could check out other versions, perhaps studio outtakes, if they have been posted on Napster; could burn my favourite version onto a new CD along with 18 or so other pieces of music and give it as a highly personalised birthday present.

This is not news from the wilds of the wired frontier. (Though by the time you read this Napster at least could be history, it doesn't really matter.)

But the implications of these acts run far beyond the literal 'gee that's cool, technology can do *anything*' discourse of a thousand hardware and software manufacturers. Everything I have described to date has been done from my Apple G3 laptop. And these days, to paraphrase singers Paul Young and Marvin Gaye, wherever I lay my laptop, that's my home This notion is a building block of the next stage of our communications evolution, the growing 'mobilisation' of our lives

It is 3am Californian time, which means I'm jet lagged again, and I'm checking email because I can't sleep and a friend emails with a list of songs he thinks I would like. Check them out on Napster is the instruction. As I am in America the connection lines are fast – and free. By 4.30 am I have five or six new songs sitting in my 'MyMpegs' folder on my desktop. I send him a musical thanks: an email with a sample attached from the Brian Seltzer Big Band for him to pick up whenever he chooses. I order a couple of the CDs from the songs I really like and give the online seller the address of my hotel in 48 hours time in Seattle. (I could of course have merely walked out of my San Francisco hotel and bought the CDs in Virgin Records, but there is a point to this.)

The point of this is that: one, I'm growing more in control of my music than ever before in my life (I'm listening to a wider, more eclectic range of music), even though there are now effectively only five major record labels in the world: Sony Universal, EMI, Warner and BMG. Hence the almost monopoly isn't making for restrictive choice, the usual result of such things. Two: I can put together the soundtracks to my life – my lives – from pretty much anywhere in the world. As an early Mpeg3 (the file format which allows the storage of CD quality recordings at a tenth of their previous size) innovator said recently, 'I'm not sure I could ever look at my computer in the same way again. It was now my stereo' [2].

In fact, the inside story of the MP3 revolution is about (yet another) fight for control brought about by the digital world and its compression technologies. This time the protagonists are the record labels, musicians, Internet entrepreneurs, and fans. And remember that every day, hundreds of thousands of music files are searched for, shared, recorded, and listened to by computer and web users – and it is all free of charge. It is a wonderful windfall for consumers and a downright disaster for record companies. Whether it is Napster happening from the US at first, or the Next Big Thing coming out of Nepal, the viral nature of the Web makes it particularly fine at disseminating free information very fast How many people had heard of Napster a year ago?

It's one of Oscar's

Let's go back to the research element It is not just music that we can explore with a new depth. The DVD is – slowly – bringing the heritage of world cinema to new generations who may not have seen the films the first time around, and nowadays would have difficulty in finding many of them even on multi-channeled digital television networks. And it is doing so in the correct cinematic 'letterboxed' format so that we can finally discover what was really happening in the left-hand side of that old Bond movie (somebody is usually getting shot).

The DVD too is an interesting concept. To date its technologies have a curious geographic and anti-duplicating catch. To ensure that an unscrupulous person doesn't, say, take a DVD of a movie which has been out for a while in the US, but not in other global markets – say Europe – the manufacturers of DVDs have added a geographic playing footprint. That is to prevent unlicensed screenings, pirating, all the usual things which copyright law strives manfully to keep up with. But let's look at its mobile, geographical potential For example, let us consider Guy Ritchie's second film, 'Snatch'. Here is a list of launch dates for the film:

Country	***Date***	
UK	23 August 2000	(première)
UK	1 September 2000	
Finland	25 September 2000	(Helsinki International Film Festival)
Hungary	6 October 2000	(Titanic International Filmpresence Festival)
Norway	21 October 2000	(Bergen International Film Festival)
Estonia	3 November 2000	
Finland	3 November 2000	
Australia	9 November 2000	
New Zealand	9 November 2000	
Yugoslavia	9 November 2000	
Iceland	10 November 2000	
Israel	10 November 2000	(première)
South Africa	10 November 2000	
Turkey	10 November 2000	
France	15 November 2000	
Czech Republic	16 November 2000	
Netherlands	16 November 2000	
Switzerland	16 November 2000	
Greece	17 November 2000	
Portugal	17 November 2000	
Romania	17 November 2000	
USA	6 December 2000	(Los Angeles) (Oscar engagement)
Israel	7 December 2000	
Sweden	22 December 2000	
Slovenia	28 December 2000	
Hungary	11 January 2001	
Denmark	12 January 2001	
USA	19 January 2001	
Switzerland	25 January 2001	(German speaking region)
Italy	16 March 2001	
Germany	22 March 2001	
Argentina	29 March 2001	

Source: www.imdb.com

Now imagine that someone in the UK got hold of an early DVD version of the film sometime in the autumn of 2000 and flew it to the USA or Germany and started showing the film... or maybe just sent it by e-mail... you get the picture. For years now in Russia kiosks showing zamizdat copies of big American films on low-grade video have been the norm This phenomenon can only grow.

Then there is the censorship issue. My copy of the uncut 'masterpiece' that is Tinto Brass's Caligula can't physically play in Europe, for example, as it has the 'wrong' footprint. It should be added that today it couldn't, for example, ever play in the UK for legal reasons because of its hard core 'pornographic' elements (there's some heavy slap and tickle in the orgy scene towards the end, I'm afraid to say); in the US it barely raises a chuckle How long such anomalies will remain is difficult to fathom; clearly much of technology's capacity to change things is influenced by local political and religious imperatives· Iran is not likely to allow films with highly graphic orgy sequences anytime soon, for example But those fine lines are undoubtedly up for grabs.

So it will come as no surprise to hear that the Motion Picture Association of America, the organisation that plays a major part in nearly every movie made, is shutting down thousands of websites worldwide and suing countless individuals simply because they offer information on DVD technology

www.conspiracynow.com is more forthright still.

> The MPAA doesn't want you to have the ability to play the DVD's YOU BUY on any DVD player or computer that they don't control… Imagine if you no longer had the right to buy imported CD's. With DVD's you can be prevented from playing any disc that is bought in another country. You could easily find yourself not able to watch a movie at a friend's house, because his video player isn't blessed by the MPAA.

Thus the DVD-Copy Control Association and movie studio members of the MPAA have filed lawsuits to stop the development of independent players for DVDs. They argue that decrypting the Content Scrambling System (CSS) encryption without a DVD-CCA-licensed player violates their trade secrets (DVD-CCA's California lawsuit) and the Digital Millennium Copyright Act (movie studios' New York and Connecticut lawsuits).

So here are a few of the key issues around DVDs, encryption, and our ability in the future to sample, copy, 'whatever', with movies as well as sound. One, CSS the encryption system for DVDs, has already been broken and its source code is part of the public domain. US export restrictions of 40 bit encryption prevented the creators of DVD's security from being able to use a high grade of encryption. Right now only PC DVD drives require the 'authentication' part of the CSS process. Using home readers, the data can be extracted and bit by bit copies performed. More to the point, offshore pirates use the same 'presses' that are used by DVD manufacturers to mass-produce DVD titles. Using a professional press, the DVD is copied like a photograph, and there is no need to bypass the CSS scheme. By controlling who has the ability to play DVD movie content, the powers that be can control the insertion of adverts, and prevent consumers from skipping through the advertisements. Oh and by the way, blank DVD disks cost 3-4 times the cost of purchasing a DVD movie.

At the moment

Until a while ago, DVD movies could only be viewed on Microsoft Windows and Apple Macintosh systems. The growing number of people using systems based on Linux were not able to fully utilise the technology. So, enter Matt Pavlovich, founder of the Open DVD group. He is part of a group of software and hardware engineers interested in extending DVD technology, in the hope of finding new and better ways for incorporating DVD technology throughout the industry.

Inevitably, there was a court case:

> I, MATT PAVLOVICH, declare under penalty of perjury that the foregoing is true and correct:
>
> DeCSS and especially its derivatives was and is essential to the development (former and continuing) of a Linux DVD player, and in this connection has a commercially significant purpose that is completely unrelated to circumvention of CSS or to copying. In particular, DeCSS was useful/necessary in analyzing – that is, reverse engineering – the algorithm used in CSS to encrypt DVD movies. Reverse engineering CSS was a necessary step in the larger project to reverse engineer DVD players equipped with CSS (for purposes of interoperability) to develop a Linux DVD player. Linux is a computing platform or operating system, for which there is no DVD movie playing application. Linux is currently the fastest growing operating system in terms of server market share.
>
> . . The Linux player will be significantly more consumer-friendly and have a number of commercial advantages over current available DVD players. For example, it will permit consumers: (1) to play DVDs using the Linux OS; (2) to fast-forward through the several minutes of commercials that the plaintiffs in this lawsuit often put at the beginning of a DVD and can prevent consumers from skipping on existing DVD players by blocking out the fast-forward capability; (3) to play some foreign DVDs purchased in other countries, which CSS's "region coding" presently blocks; (4) to play

> movies more efficiently and with higher quality than on currently available DVD players; (5) more effectively utilize the current hardware found in most consumer PCs so that hardware upgrades would not be required in order to play DVD movies; (6) operate on computer systems of lower speed specifications than those required by currently available commercial products to operate, thus allowing a larger number of computer users (and, in particular, those with more dated equipment) to take advantage of DVD technology without having to purchase more expensive hardware; and (7) to do all of the above with a low or free operation cost.

Makes sense to us. And it also seems that for hundreds of conceptual video artists who are looking for source to sample and play with, cinema's back catalogue is about to become available. Well, yes and no Right now if you take even a screen shot of a commercial DVD, strange things happen when you try and manipulate or copy it Essentially the image vanishes.

But in the longer term – even just for fair usage by film students eager to capture the framing sequence of a film – DVDs will have to yield up their secrets. What, for example, is the logic of being able to capture images – or duplicate – from the VHS of Star Wars, but not the DVD? Technology does not bring new copyright entitlements, merely attempts by copyright lawyers to squeeze further revenues from us.

The moving finger

The implications for the futures of these media, music and video, is fundamentally the same in business terms. Digital data is limitlessly replicable, and so brings the marginal costs of reproduction down to zero. Thus, in time, new economic models will be created. We are already seeing software without boxes, we are seeing 'fair use' swaps over the Web. We are seeing the beginnings of a new kind of solid digital economy based not so much on paying for packaging as in – one day soon – paying for a number of downloads. Millions of downloads at one penny soon add up; and there is no distribution channels to worry about. That makes for a very creative time for us collagists, us samplers of music, us 'poster makers from movies', us cultural magpies.

Soon enough the e-book will be here in depth and quantity too; and that is not on an e-book player that is proprietary and populated only by Harper Collins or Penguin books. It is part of the laptop, and the Pocket PC and the Palm Pilot.

That's the laptop which is already a stereo, a cinema, a print shop, a music studio and a darkroom – as well as the more prosaic notebook, accounting ledger and diary. It seems only fitting after all this that the little thing should become a library too.

That's a 'moveable' stereo, cinema, print shop, music studio, darkroom and library. Dumbing Down has never seemed quite so attractive or 'mobilised'.

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The convergence of convergence

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Examines the relative merits of digital information platforms. Included are online systems, CD-ROM, the Web and mobile distribution platforms. Proposed a methodology to assist in the determination of the relative merits of the platforms. Reach and Complexity are the two key characteristics used to 'type' the various platforms Power Ratios are calculated for each platform. Considers the digital information platform of the future.

In his book *Being digital* Nicholas Negroponte [1] describes CD-ROM as 'the Betamax of the 90's'. If this seems a little harsh, bearing in mind that CD-ROM is still alive and, for some applications, very much kicking, those of us who tried to run publishing ventures selling content-rich CD-ROMs for the consumer market in that period know exactly what he means Lessons are being constantly learned in the volatile and highly market-sensitive digital publishing environments that have opened up in the last 20 years. One of the earliest, and hardest, lessons is that consumers do not give a monkey's about technology.

That statement does need to be qualified The needs of what Jupiter and other consultancies have identified as the 'Technically Advanced Family' (or TAF), can differ substantially from what the Homer Simpsons of this world want from their information and entertainment delivery systems (Doh!). TAFs, confusingly for market predictions, are indeed turned on by technology platforms and are the first to adopt them. For the entrepreneurs trying to extend digital business ideas into new markets, listening to what TAFs say they want is like asking Bruce Ismay what he wants in a boat, or what Barnes Wallis wants in a bomb. Only now are those entrepreneurs finding out that selling a digital product is like selling any other product: it has to be fit for the purpose, fill a need, and work smoothly and easily without calling on the consumer to change their life pattern to accommodate it. Whereas TAFs will get excited about a new platform or technology, and may well change their lifestyle to adopt it, Homer will not

Information delivery systems always demand some level of adoption, digital or not, and all digital information delivery mechanisms depend for their success on a combination of Complexity and Reach This is best analysed by looking at the various distribution platforms available to the information industry.

- *Bespoke, tailored online systems* have been with us since the late 1960s, usually, though not exclusively, in business-to-business applications. They are characterised principally by their expert or semi-expert retrieval languages, and often by the way they have addressed vertical niches with powerfully expressed information needs. Not all have met the last criterion· systems such as FT Profile, developed for and delivered to the general business community in the 1980s and 1990s, have survived so long by promoting width rather than narrowness. But generally speaking they have been the exception rather than the rule in this market.
- *CD-ROM* has been available for the publication and distribution of data since the mid-1980s, first almost exclusively for the re-purposing of large scale reference works such as Grolier, and then from the early 1990s for consumer reference, newspaper archives, games and just about anything else that needed scale without timeliness.
- *The Web*, famously, transformed the academic and defence network of the Internet into a consumer medium almost overnight from 1993, when as Tim Berners-Lee has said in a 1997 talk for the World Wide Web Consortium, he was able to move from persuasion to proliferation [2].

- *Mobile distribution platforms*, such as Personal Digital Assistants (PDAs) and personal handheld computers, have been in the market since the early 1990s, though admittedly without much of an information distribution role, and have now been joined by the cellular phone. Now that Web services for mobile devices have joined Short Message Systems (SMS) and are about to enjoy the benefits of added bandwidth through the development of the Generalised Packet Radio Services (GPRS) which are being released, this will soon be a true information distribution platform.

Finding the power/reach ratio of information platforms

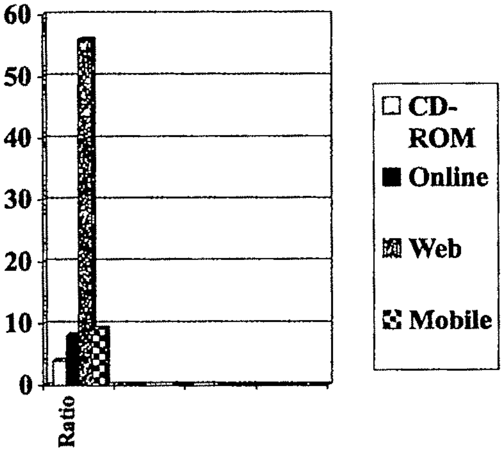
Every new distribution platform carries the same level of hyperbole as the last. It is always the one that is the final panacea for the global information hunger, that will replace all other methods, that will create millionaires out of everyone who publishes through it and that, above all, supersedes the previous final panacea

Even to the lay observer, there are pros and cons for every digital distribution medium. The recent explosion of press coverage and predictions for Wireless Application Protocol (WAP) led to an intensity of speculation, investment and market positioning, only to be followed by a dull whimper when the TAFs who bought WAP phones realised they were working with a 9600 baud download and a screen the size of TweetyPie's underpants. CD-ROM looked as though it would become the chosen distribution method for complex, data-intensive single player games, and has had some success, but has failed to unseat dedicated platforms such as the PlayStation Faced by questions over the distribution of time-sensitive information and costs of content production, CD-ROM lost out almost overnight to the Web. And business-to-business online has had to adopt Web distribution, at some considerable cost to industry margins, also as a result of the Web

The Web itself, despite reaching much of the phenomenal growth predicted for it, has recently begun to stagger under the weight of expectation that users have of it, particularly in relation to the age-old question of precision versus recall.

How, then, does the information professional, and particularly the developer of services for various platforms, decide on the relative strengths of each one? The author believes that the value of a digital platform can best be judged by a combination of Reach and Complexity, to gauge the power of how

Figure 1 *Power Ratios characterising and comparing digital information platforms*



- **Complexity:**
  - CD-ROM 2
  - Online 2
  - Web 7
  - Mobile 1
- **Reach:**
  - CD-ROM 2
  - Online 4
  - Web 8
  - Mobile 9

well the data it carries will be distributed among the appropriate audience.

Complexity in this instance is not the complexity of the information product itself, but its ability to convey a complex message, or series of messages, across an audience. To put it more simply, how much ground does it cover? A single CD-ROM of chemical abstracts may be complex in both its subject and as a CD-ROM, but it covers a very defined vertical niche and is distributed only to selected niche users. The same database on the Web has an increased Complexity because of its distribution mechanism and because of the ability to combine it, in the same distribution platform, with related and unrelated information. Reach, quite simply, is the width and depth of the potential data audience, and by definition those digital platforms with the greatest levels of connectivity and interactivity will have the greatest Reach

It is a somewhat simplistic mechanism, but by combining Reach and Complexity into a Power Ratio, it is easy to see that some digital distribution methods are more powerful than others are. Figure 1 shows some suggested Power Ratios for the distribution technologies we have been discussing

The Power Ratio for CD-ROM is low because its Reach is poor and it is not a very complex product from an information viewpoint. Online, though carrying some extremely complex subjects, is even more niche focussed in terms of its audience, though it has a wider Reach, being a connectivity medium Compared to the Web it is, however, relatively low in interactivity The Web is by far the most complex information product so far, and the audience Reach of the Web is outstanding, so it has a high Power Ratio, as indeed will the mobile phone one day. Mobile will undoubtedly penetrate the market further and with more depth than the personal computer, currently the chief conduit carrier of web activity, but its Complexity is, because of bandwidth restrictions, indescribably poor from an information standpoint.

It should be stressed again that the Power Ratio is meant to describe, principally, the usefulness of the digital distribution mechanism, not the usefulness of the data carried. Many would argue, for example, that CD-ROM has developed in many applications as a specialist publishing medium, and that the value of the data carried is enhanced and was high to start with, whereas much of the data on the Web is very poor. If we are to understand, however, the nature of new distribution mechanisms, what role they play and how they may be combined, we have to at least try to understand the inherent nature of each.

These questions become particularly important as we try to understand the nature of the next stages of development: the possible growth of a full-service network (FSN) away from the PC platform, probably in the home, supported by widespread use of mobile access from a hybrid hand-held PC/phone. Information and data providers must assess the potential of each new platform and its ability to carry data before they can develop compelling services, otherwise Homer will not want to know. The FSN has been the topic of hot debate, in the sadder circles of the world of information at least, for a number of years. It matters to all of us, though, because the level of partial clash versus convergence we have seen so far, for example in the worlds of Business Online and the Internet, will pale by comparison with its impact.

Some questions that arise include.

- Does the business/specialist consumer still need bespoke online services in the face of the Internet and, particularly, the Web?
- What role does CD-ROM play? A supplemental one?
- Will Broadband and Interactive TV change everything again?
- What will be the role of Mobile?

Now imagine the answers to these questions when.

- The TV is the local file server, with at least Broadband delivery channels and integrated telephony as the back path. Not much more development to put in place over what Open, Ondigital and the more enlightened cable channels are now proposing and starting to deliver.
- Always-on Internet.
- Ubiquitous global roaming and unique, portable personal phone numbers linked to location-based services and sophisticated

GIS systems.

- Broadband (at least 2Mbit) access from fixed *and* mobile devices
- Commonality of consumer identity over all platforms (we know who you are, wherever you are)
- True on-demand publishing of all print products.

These are all developments that are almost in place and, whilst not certain to happen, are very likely to do so. What will the entrepreneurial information provider have to do to service these channels? Some evidence comes from the mechanisms we have already seen develop and described above None of the existing delivery platforms has disappeared, but they have been mutated and partially merged with their successors, and the same could be true of new developments.

Strategy 4 for survival in the 'cut-throat web economy' described in Evan I. Schwartz's book *Digital Darwinism* [3] is to 'Create Valuable Bundles of Information and Services'. An example of this seen recently was an Internet diary manager that could be managed from a cable TV digital service, then linked to an SMS mobile for reminders to be sent. What struck the author about this service is that it is likely to appeal to the Homer Simpsons rather than the TAFs of this world, because it circumvents the need for PC access.

Conclusions

More work needs to be done on gaining an understanding of the impact of each new delivery channel and platform and the impact each has on its predecessors. Frustratingly for the practitioner, the major consultancies tend to leap from development to development, announcing new levels of stratospheric market share for those brave enough to market them immediately (the old chestnut about 'first-mover advantage' often gets quoted here). About four years ago, the author attended a consultancy breakfast meeting, where he was told that, unless his business adopted push technology immediately it would be all over. A couple of years later he attended a consultancy lunch where he was told that, unless his business adopted Portal strategy immediately it would be too late. Recently the author attended a consultancy dinner where he was told that, unless his business moved into interactive digital television delivery immediately then he had better forget it. I have not done any of these things yet, and I think I have saved my company a lot of money in the process.

Most people in the information industry (in its widest sense) are missing the main lesson of the digital revolution. It is a lesson that those who started their careers on, say, a humble reference desk learned many years ago. The more information you make available to people, the more they consume. The same is true of platforms. It is very easy to imagine a day in the relatively near future when delivery channels and platforms are information neutral. and shortly afterwards, become invisible. If the consumer sees the platform rather than the data, it is getting in the way.

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What chance serious debate in the modern media?[1]

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A content analysis of the coverage of European Union stories in British daily newspapers. Three months of newspapers were scanned on a daily basis and their pro and anti stance monitored Includes an analysis of websites.The results show that for both hardcopy newspapers and their online equivalents the anti-European press is passionate in its beliefs, whereas the pro-European press are largely solid but unexciting in theirs. Concludes with the view that in political and newspaper speak Europe is just not a 'heart' issue.

The Editor of *The Guardian*, Alan Rusbridger, had this idea that anybody who wanted to take an informed view of the EU, and specifically the case for this country joining the euro, would find it hard to form that view on the basis of what he or she read in the British media, or indeed saw or heard on television or radio. He thought it would be interesting to monitor the national press to decide whether or not this was the case.

So it was that I found myself reading every EU story in every national paper every day, for many months, and reporting my findings each week in *The Guardian*. Of course at times it has been a chore There have been days when I would rather have read the papers in my usual way, picking on stories or columns that interested me, or were relevant to my work, or which simply grabbed my attention. But it has not been like that. I have effortlessly glided across such fascinating topics as Posh Spice's stolen luggage full of Brooklyn's trainers in favour of yet another piece on prospects for the Nice summit or Nato's attitude to the rapid reaction force. I have become a Euro anorak But it has been a fascinating exercise. Imagine that you are an intelligent person, politically interested, who has grown up in this country and been aware throughout your life that Europe is important That it is an issue. That it divides politicians and destroyed the last Conservative government.

New Labour includes a number of politicians who grew up anti-Europe – it was fashionable left to be so, because socialism was international and Europe was a capitalist conspiracy Many of them, including the present Prime Minister, were anti-nuclear too – how times have changed. But New Labour is officially the party of Europe, of developing and expanding the European Union, of taking Britain into the single currency, the euro, 'when the conditions are right'. A crucial phrase that, because it is an easy excuse for dragging heels, as long as it is not explained too much. Blair, like Major and Thatcher before him, likes playing on big stages, likes those contrived photographs where he is surrounded by fellow prime ministers, likes summits. And the EU offers lots of summits. So officially, in manifestos and other policy documents, Labour wants to be at the heart of Europe – another cliché they love – and sort of wants to join the euro. The Conservatives, having learned nothing from the internal struggle, over Europe, which tore them apart under Thatcher and then Major, is the anti-Europe, or certainly anti-euro, party. So to that extent we have a proper debate with the government and official opposition each representing the opposing standpoint. Democracy in action. We can rely on the contrasting and contradictory views being put forward. We can listen. We can weigh. We can decide At least in theory. The practice is rather different. We have a government that would rather not talk about the issue in any detail, for fear – and they are probably right – that the majority of the electorate is not very enthusiastic about Europe, and certainly antipathetic to the euro. 'Save our pound' strikes a chord, and the Conservatives are always plucking it. So failing to get much clarity out of our elected leaders we turn to the media to inform us, to lay the debate before us, to provide the intellectual kit to help us make up our minds.

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[1] Much of the research for this article was carried out week by week for a regular column in *The Guardian* considering the coverage of the euro-debate in the national press in the UK The article also draws on Professor Cole's Inaugural Lecture to the University of Sheffield

Analysis

So does the media debate happen? Is it helpful? Are we being served? Television is a dead loss Radio is better, but like television has a statutory obligation to be balanced, which can on occasion stifle useful debate. So we come to the printed media, where balance is neither required nor provided but where the space and time are available to lay out the issues, to present arguments and, most importantly, information that allows the reader to make a judgment. The author's own view is that in a complicated matter like Europe, the arguments for and against greater integration, for and against more federalism, for and against the single currency, can really only be properly rehearsed in print, on paper or online But do we get that in our newspapers? Back to the original point, and all the detailed reading over the past two or three months The richness of the British press lies in its diversity. Different views, different political standpoints, are represented. Different sectors of the market, political, intellectual, socio-economic are catered for.

The problem with the euro-debate is more to do with the entrenched political positions of the various newspapers. It is fair to say that in the broad the *Daily Mail*, *The Daily Telegraph* and *The Sun* are the most eurosceptic newspapers. The first two are committed Conservative newspapers; *The Sun* voted Labour in 1997 and has announced that it will do so again in the next general election. The most pro-European newspapers are the *Financial Times*, *The Independent*, *The Guardian* and *The Mirror*. The last three support Labour, the *Financial Times* did so at the last election and may well do so again. Essentially it supports business. That is its market place

I am sure none of us has a problem accepting that the European argument is not simple, clear, right or wrong, or even one determined by one's own position in the political spectrum. You can be Conservative and pro-European although it won't get you far, will it Ken Clark? and you can be Labour and anti-Europe but do not tell Alastair Campbell. It is the level of debate that is disturbing, ranging from silliness among some on the eurosceptic right to reticent embarrassment among too many supposed believers around New Labour and the Liberal Democrats. The absence of courage of their convictions often suggests as much about the strength of their convictions as their courage. The result is that the sceptics make much more noise. While the euro-committed newspapers seem relieved when they can ignore the subject, the sceptics are forever looking for reasons to include it. This gives rise to absurdities which seem only to insult the intelligence of their readers.

Some headline examples.

EU blamed for eggs that taste of fish	*The Sunday Telegraph*
The scandal of why cod has had its chips – The death of Britain's favourite food is a devastating indictment of the European Union ...	*Daily Mail*
EU picks German to lead 'forerunner of a new Euro army'	*Daily Mail*
Euro army is a threat to Nato	*The Daily Telegraph*
Millions died for Britain only for Blair to surrender	*The Daily Telegraph*
Britain agrees to bail out euro failures	*The Daily Telegraph*

What Blair has really given us – More red tape, More secrecy, More lunacy	*The Sun*
Last chance to save the pound	*The Sun*
French lose appetite for fish and chips	*The Daily Telegraph*
Brussels test case leaves Metric Martyr in the dark – the greengrocer and his imperial bananas	*The Daily Telegraph*
Lottery players to pay price of joining euro	*The Sunday Telegraph*

Individually, quite amusing. Individually, one or two legitimate stories, and you could say that the euro-supportive newspapers were being just as partial in choosing not to run any of them. This was particularly true over the European rapid reaction force, the so-called Euro army, which made so much news in the period leading up to the Nice summit. *The Guardian* and *The Independent* were dismissive of the howls of rage from the *Mail* and *The Telegraph*, saying the eurosceptics were inflating a modest proposal for a force that would be subservient to Nato, and intervene only when Nato chose not to. Jacques Chirac, followed later by the new US Secretary of State Colin Powell, put a much more *Mail*-like gloss on that issue. Chirac's view was much closer to the Euro army depicted in *The Mail* and *Telegraph*. Powell gave the lie to *The Guardian/Independent* line that Nato was unworried about the proposed European force

But overall *The Mail* and *Telegraph* hammer away relentlessly at the bureaucratic absurdities of the European Union, along the lines of the endless straight banana stories of ten years ago. They depict a community where Brussels bureaucrats, and their supporters in Paris, particularly Paris, and Berlin, organise things so that eggs taste of fish, innocent greengrocers face years in jail for selling a pound and a half of apples, fish and chips are banned because we are no longer allowed to catch cod, the German army marches through Winchester as the Luftwaffe flies overhead, and the EU flag flies over public buildings. All the while the pound sterling has been replaced by some nasty little euro.

It is not as if there is no serious case against the euro or moves towards a more federal Europe. There is. Many in this country fear the economic consequences of fixed exchange rates, fixed interest rates, over regulation of business and the labour market, gratuitous regulation of endless aspects of our lives and our national ways which should be left alone, or left to us. There is a case, sincerely held by many intelligent people, that our history, culture and geographical location make us different from the peoples of mainland Europe, that we are more inclined to need to be left alone and not be interfered with. *The Telegraph* makes this case from time to time, but it diminishes itself by incessantly banging on about the little things. It is implicitly xenophobic in that it implies that 14 other advanced industrial nations crave uniformity, bureaucracy, red tape – and doubtless straight bananas and a cod-free diet. It implies that Britain, alone, has national pride, independence and its own distinct identity. This in an age when a huge proportion of the population have been to France, to Italy, to Germany and seen for themselves how different, how proud, how independent those countries and those peoples are.

If *The Telegraph* is implicitly xenophobic, *The Mail* is explicitly so. *The Mail* basically does not like foreigners. *The Mail* is a tremendously successful newspaper It has seized the middle market, trounced the lamentable *Daily Express*, and continues to build circulation, which is now above two million It does it through the only formula that works – knowing its readers, intimately, and pandering to, reinforcing, their prejudices. *The Mail* finds in the European Union a subject that draws together many of its prejudices. It is made up of foreigners who seek to impose their ways on us. It is made up of people we either defeated or saved in great wars, peoples who have since prospered more than we have. It is made up of people who want to tell us what to do, who operate liberal social and penal policies, who believe in high tax and high public spending

And now they seek to nick that symbol of all that is great about Britain, the pound

Is this debate? Often it is not. It is simply propaganda.

The trouble with the pro-Europe position, and the reason the debate often seems dominated by the antis, is that the newspapers that broadly support Europe and the euro lack the confidence and conviction of *The Mail* and *Telegraph*. Often it seems they apply the 'if in doubt leave it out' approach. They seem a little bored with European stories, with the result that the volume of European coverage is heavily weighted towards the antis. While it is easy to be strident and publish provocative and catchy headlines about eggs tasting of fish, or German soldiers marching through Guildford, it is not easy to do the same with qualified majority voting or the joys of enlargement. The pro-euro case is about economics and institutions, about trade and investment, and is not, in the word beloved of copy-tasters, sexy.

In an era where newspapers have moved away from the mandarin approach of giving readers what they need in favour of what they want, or editors perceive them to want, the reasons for running the middle ranking European story are seldom strong. Rows are fine – newspapers like rows, because rows concern people. So if the story is about disagreement between Tony Blair and Gordon Brown about the extent to which Europe should be discussed, that will get in. If it is about Brussels, all night wrangling among fishery ministers about quotas, then it is more difficult.

John Birt's most famous expression was the 'mission to explain'. When Labour rethought and repackaged itself in the late eighties and early nineties, when it became New Labour, it had to explain itself. It had, day by day, through speeches and publications, through the media, to sell the idea that it had changed It briefed journalists sympathetic to the project, won them over, and fuelled and sustained a debate that led ultimately to election victory. That has not happened with Europe. If politics is the art of persuasion, there has not been much politics about Europe Part of the reason for the lack of passion, or indeed coverage, on the part of the newspapers sympathetic to the European project has been the reluctance of the politicians to grab it and sell it. Newspapers report and reflect events. If they have a line to pursue they will usually seek to hang it on events.

The Nice summit was at least an event. The Prime Minister could hardly avoid talking about it. So there was, for a few fleeting weeks, a reason to write about Europe. But even then, some papers seized it more than others *The Times* was particularly distinguished during this period, clearly embracing the mission to explain with a week long series of briefing pages laying out the issues, the positions of the various member states and the consequences of possible deals. It was a week in which it was possible to learn from *The Times*, in which the information to inform the debate was available to those who sought it.

Since then Europe has been back on the foreign pages in the euro-supportive press, and the antis have again seemed to be in control. So we have the paradox of an issue said by politicians and commentators to be of fundamental and historic importance continuing to lie dormant. The politicians brave enough to insist that it is talked about – Heath, Heseltine, Clark, Mandelson – have faded from the scene. The leaders of the governing party, still promising a referendum when the time is right or early in the next Parliament, are perfectly happy for the press to be relatively quiet. Commentators driven by what they consider important rather than what is going on – such as Donald Macintyre of *The Independent* and Hugo Young of *The Guardian* – regularly try to keep the debate alive But they are often still, small voices.

Only the *Financial Times* covers Europe as a daily, ongoing story, thus informing the debate in the best way possible, by reporting events. But the *Financial Times* too knows its audience. Big business is doing business in Europe, so Europe matters, in the same way that day-to-day stories about Wall Street or the London Stock Exchange matter. The financial story is more important than the political one

So if you read all the coverage in detail you are left with the feeling that the debate exists because the antis are so vocal. And if they often reduce the debate to emotive inconsequentialities, at least it lies there provoking a response. It is the fault of the pro-euros if the response does not come.

But the medium these days is supposed to be online, even if some of us only partially subscribe to that view. Where does the Web stand in terms of a contribution to the debate on the euro? Do the newspapers offer more on their websites than they do in their hard copy publications? Does the Government argue the case for the euro more enthusiastically, or simply more, than it does in ministerial speeches, debates and briefings? Is there a range of other sites to help the serious seeker after information, the floater who might want to examine the arguments for and against UK membership of the euro?

An exhaustive search of the Web is of course a contradiction in terms, but an examination of the more obvious or likely sites was revealing. Where better to start than with the Government? Where better to start than at No. 10? After all, the Prime Minister finally mentioned the euro and the referendum, during February, when election foreplay was becoming vigorous. Peter Mandelson, portrayed as the most enthusiastic European in the cabinet, was gone, and concern was being expressed that with him out of the way those who favoured caution – meaning silence – meaning Gordon Brown – would be in control. When suddenly one day, at Prime Minister's questions, Tony Blair, in response to William Hague, said that of course the referendum decision would be taken in the first two years of the new Parliament At least that was the way it was presented; what he actually said was that the consideration of whether the Government's own criteria had been met would be taken within two years.

But, as is often the case in politics, an over-reported, over-interpreted phrase can change the atmosphere. Robin Cook, Foreign Secretary, and Stephen Byers, Trade Secretary, were out talking up the euro, and the loss of steel jobs and Vauxhall jobs were being interpreted in some (pro-euro) quarters as the shape of life outside the euro-zone. But it was certainly not true that Europe was suddenly high on the Government's agenda, more a case of when driven to it there was a need to say something As the election gathered pace the Government was far keener to talk about the economy, education and health, just like the electorate.

So is it surprising that the visitor to the No 10 website [1] finds it hard to encounter Europe and the euro? With the opposition making 'save the pound' a key election issue, where is Downing Street fighting back? We are welcomed on the home page with the headlines foot and mouth disease; better pay for NHS consultants; tackling animal rights extremists; more money for rural buses; 150 toy libraries for young children. No mention of Europe So we try the button marked 'Facts'. 'The factfiles section gives you background on policies', we are told. There are Brief Fact Files. These include files on beacon schools, cutting car crime, rough sleeping, transport 2010, and winter fuel payments. At first glance, nothing on Europe Then you notice NICE. Presumably a reference to the Nice summit, with its crucial discussions on the development of the EU. Click. What does the National Institute of Clinical Excellence do? And there are In Depth Fact Files. These include files on rural Britain, crime reduction strategy, the national childcare strategy and sharing prosperity. No mention of Europe. We are digging deep when we have to visit Manifesto Commitments, the 177 items the Government laid out back in 1997. The 'leadership abroad' section starts at commitment number 155, and finally, number 162, there it is· single currency. But that is the state of play four years ago.

That is the way the Government wants to keep it. Lobby briefings, or a version of them, are given on the No 10 website. The day I looked was 19 February 2001. Quote.

> Asked if the Prime Minister agreed with Stephen Byers on the outlook for business investment in the UK relating particularly to the fact that Britain was outside the euro, the Prime Minister's spokesman noted that this was one of those stories where if we said anything we were accused of either warming up or cooling down on the euro. The government's position on the single currency was entirely as was set out and well known. We would continue to work hard

> so that Britain remained the number one location in which to do business.

Hardly the Government contributing to the debate, informing the public, or arguing its case. How very different when we visit the online Conservatives [2]. The 'keep the pound' logo is on the home page. One click and we are in the 'keep the pound' section of the site, with its 'we love the pound' headline. There is the running total of the percentage of the electorate who want to keep the pound. There is the mission statement: 'We believe that Britain should be in Europe, but Keep The Pound.' It is a busy, active page, packed with anti-euro passion.

But we must give the Government another chance. No 10 may not seem to care, but what about the Foreign Office [3]? We know Robin Cook is a euro-enthusiast; we know he spends a lot of time with European political leaders. But on the other hand he knows No 10 is watching. The Foreign Office site is as fond of 'facts' as the No 10 site 'Facts, not myths' proclaims one of the 'key foreign policy themes' pages. Yes, Europe, a key foreign policy theme Foreign Office minister Keith Vaz welcomes us. It certainly hasn't the passion or the propagandist tone of the eurosceptics:

> Britain and the European Union. These pages provide information on aspects of government policy in the European Union. You can find information on some of the most topical issues and background on other aspects of the EU through the links to the right.

And on the EUmyths pages we find 'common misconceptions', 'rebuttals' and 'frequently asked questions'. Mr Vaz deals with all these points himself, which suggests some interest in the subject. But it is all very downbeat, and in a sense out of time. 'Straight bananas? Square tomatoes?' are hardly 2001 issues.

So yes, we can get information on Europe and the euro online, but it suffers many of the same faults as the newspaper coverage. Passion from the antis. Solid, unexciting data from the pros. The European Commission is ponderously detailed. Its euromyths are called 'A glossary of eurosceptic beliefs.' There are a series of statements such as 'Emu means a superstate through the backdoor' and 'Europe never plays by the rules: Britain always loses out' followed by screens of rebuttal text Slow, unappealing. The Web is useful for students of European politics, for those in the Euro business. For the politically interested, the euro agnostics seeking after information to help them form a view, the Web is not a great help.

Politics is about vision, turning a complicated idea into something to be reached out for. Politics is the art of persuasion. It is not surprising that those who support the case for greater European integration, for the single currency, have such a hard job winning over the hearts and minds of the electorate. Perhaps it just isn't a 'heart' issue.

References

1. No 10. www.10downing street.gov uk (visited 19 February 2001).

2. Conservatives Online. www.keepthepound.org.uk (visited 19 February 2001).

3 Foreign and Commonwealth Office. www.fco.gov.uk (visited 19 February 2001).

Health kiosk use: a national comparative study

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Provides an initial analysis of the use of InTouch with Health touch screen information kiosks located throughout the UK. Presents data for more than 50 kiosks and models use to a variety of variables. The data were collected via kiosk transaction logs and questionnaire. Seeks to explain use differences between kiosks The amount of kiosk use and the number of kiosk users were explained in terms of both neighbourhood factors and kiosk host factors. Significant variables determining the amount of use and number of users include the size of the kiosk host organisation and whether intermediary help is available to the kiosk user, either from a health professional or a receptionist. The general economic well-being of the area was found to be significant in explaining the length of session time, while word of mouth and help from other users was a significant variable explaining the number of session pages viewed.

Introduction

The Government is busy locating several hundred 'free' NHS touch screen kiosks in health centres, libraries and other locations, and the private sector has also been alert to the huge potential audience for their digital health products InTouch, an IT health information company, has installed nearly 100 kiosks in GP surgeries, hospitals and health outlets around the country using content supplied by the Department of Health, medical charities and other health organisations. The subjects covered by the kiosks include medical conditions, support group contact information and healthy travel/living topics.

With hundreds of touch screen health information kiosks arriving on the consumer healthcare scene in such a relatively short space of time this must constitute a major, albeit quiet and unheralded, information technology revolution. Plainly this constitutes a significant and bold move in health information provision – especially for those information communities (i.e. the elderly, impaired, poor and young) that might have missed, or been left behind by, the PC/Internet revolution. As part of a Department of Health funded project[1] the authors of this article have been monitoring the use and impact of more than 50 InTouch with Health kiosks nation-wide. These kiosks cost the host organisations £7,000 to install and then about £1,500 per year to maintain. The information is updated about once a month. The initial results of this study are presented here.

Aims and objectives

The main aims of the study upon which this paper are based are:

- To provide an early insight into what kind of use patterns are developing nationally as a result of widespread health kiosk information provision The metrics employed to portray this use are: screens viewed, screens printed, screen view time, number of sessions conducted, session length time, number and characteristics of users.
- To explain variations in use and user numbers between kiosks. Pilot research [1] had pointed to substantial differences between the number of pages viewed between locations A number of neighbourhood factors and kiosk host factors were tested as possible explanatory variables.

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[1] The Web, the kiosk, digital TV and the changing face of consumer health information provision: a national impact study April 2000 – January 2002

Scope and coverage

The kiosks studied were PC based touch sensitive screen medical information systems (Figure 1 shows what a kiosk looks like). They were developed by InTouch with Health, a leading UK consumer health information company.

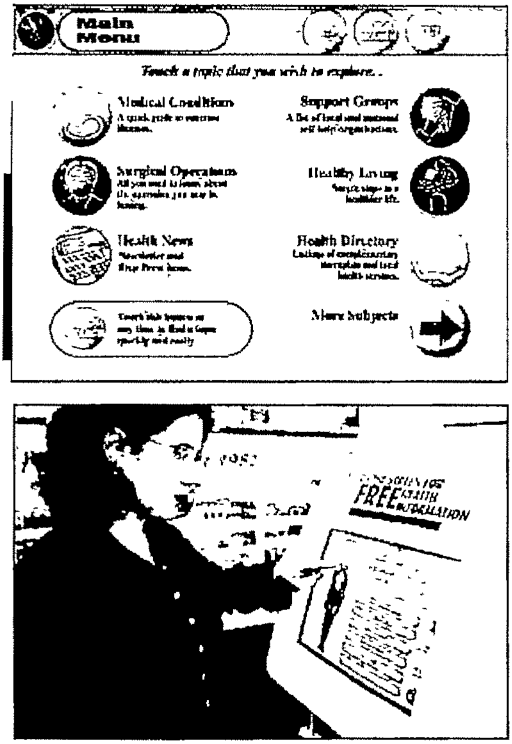

Figure 1. *InTouch with Health kiosk screens*[2]

To start a session users have to enter their age and gender and from there are lead to a main index page This has six options: Medical Conditions, Surgical Operations, Health News, Support Groups, Healthy Living and Health Directory. A tab indicating 'More Subjects' is situated at the bottom of the screen This leads to two more entries: A-Z of the NHS and Travel Clinic. Although the construction and layout of each section is not quite the same, activating any of the main menu items leads to a further list of contents. In some cases, such as 'Medical Conditions', the list – often considerable – can be shortened by various methods. One of these is to touch the relevant part of a body diagram to limit the list to entries related to this. Another facility, offered by the Support Group entry, allows users to key in the first letter of the item they seek. Further content selections are then displayed. Indeed, in some cases five screens are required to arrive at the required information.

At the time of the study InTouch had installed 79 health information touch screen kiosks around the country However this paper concerns the 56 kiosks for which log data were available. Despite InTouch promoting the kiosks nationally, they nevertheless tend to be clustered in certain parts of the county Plotting the site locations on a map would produce a wide strip from the south to the north, where the extremities are poorly served. Thus, Devon and Cornwall have no kiosks (although one is about to be installed in Truro), and Norfolk. Suffolk and the whole of Wales are also without kiosks. In Scotland there are several terminals, although clustered in three cities hugging the east coast. Twenty-nine of the kiosks were located in doctors' surgeries, 20 in hospitals, 7 in pharmacists, and the rest consisted of kiosks located in a variety of locations such as walk-in centres, supermarkets, libraries, a prison and a mobile van.

For 35, or just under two-thirds of the kiosks, data were available for the whole period January to September 2000. For the rest data were supplied in an incomplete form. For a further 17 or 30% of the kiosks data were available from either February or March to September or from January to August. Of the remaining 4 kiosks data were available for 3 between January and April or March, and one month's data were available for the remaining kiosk.

In total the period covered well over a hundred thousand (116,647) user sessions and nearly a million (961,162) page views, which makes it the biggest evaluation of kiosk use ever undertaken in the UK Kiosk log files provide limited personal information on the user.

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[2] Images from http //www.sheffieldlpc demon co uk/touchscreen/index htm#touchscreen%20project (visited 8 September 2000)

Methods

Data were derived from three sources:

- Kiosk transaction logs.
- Questionnaire responses from kiosk host managers.
- Geo-demographic datasets.

Log analysis

Users of kiosks enter their age and gender before using the system. Via the postcode of the kiosk location we also knew roughly where they lived. The system then logs their every move. Table 1 shows the log of a user session for illustration. The first column codes the status of the page as initial (H), current (D) or terminal (T). The next three columns record the date, day and time. The fifth column, starting 0000, records the seconds that have elapsed from entry. The system does not record the time taken by the user to fill in age and gender details that are requested at the beginning of a search session (see sixth column, first row). The '1' to the right of Male is the age grouping and repeats the 'under 15' age grouping information. The clock starts when the user selects continue from this page. The data in the second row of the fifth column – 0001 – is the time taken to download the first menu page. This user spent 7 seconds (8 including page download time) in negotiating the first menu page (fifth column, third row). The numbers and hash signs in the sixth column refer to page and section identification codes. The 001 towards the end of this line is a page counter. The counter though does not count the opening dialogue page where the user records their age and gender. This user session portrayed here lasted 85 seconds; the longest page view was for 21 seconds and the shortest for 4 seconds.

Log files do not furnish an error free record of usage: new users may take over the kiosk from a previous user resulting in session period errors. The InTouch with Health kiosks partly overcome this problem by timing out and restarting after two minutes of user inactivity. However, compared to other usage recording logs, such as Internet access logs, kiosk logs do give a more accurate picture of usage. After all it is not uncommon to discard 85% of lines of an Internet log.

Use metrics employed for this study were developed to facilitate a comparison between kiosk locations which have varying opening hours and remain open for differing lengths of time. Quantitative metrics of use, users and number of screens printed were computed to an hourly rate The metrics used for an evaluation of kiosk use were:

- Amount of use as constituted by the average number of pages viewed per hour
- Number of users – average number of users per hour.
- Number of pages printed – average number of pages printed per hour.
- Page view time – average number of seconds taken to view a page.
- Session time – average number of seconds taken to complete a session.
- Number of pages consulted per session – average number of pages viewed in a session

Table 1. *Example of a user session from a kiosk log file*

H	10-Jan-1999	Sun	15 14 17	0000	Male 1 under 15
D	10-Jan-1999	Sun	15 14 18	0001	1###########################001#XXX
D	10-Jan-1999	Sun	15 14 26	0008	#6##########################002#XXX
D	10-Jan-1999	Sun	15 14 32	0014	#6a0#########00001##########003#XXX
D	10-Jan-1999	Sun	15 14 50	0032	#6a2#########00001##########004#XXX
D	10-Jan-1999	Sun	15.15 10	0052	#3-################600001###005#XXX
D	10-Jan-1999	Sun	15 15 14	0056	#3–####0015#######600001###006#XXX
D	10-Jan-1999	Sun	15 15 21	0064	#3–a###0015#00090#600001###007#XXX
T	10-Jan-1999	Sun	15 15 43	0085	

The metrics covers two broad areas: use take-up and how users navigate around the kiosk. The amount of kiosk use and number of users leads us to examine differences amongst kiosks in attracting users and the problems of getting started. While length of session time and number of session pages viewed give us an idea of how users successfully navigate around and use the information resources.

Questionnaires

Questionnaires were sent to all 79 kiosks in the country and 50 were returned. Out of the 56 kiosks for which log data were available 48 returned the questionnaire. The questions covered a variety of topics such as the reasons for kiosk installation, its physical location, promotion to the public and whether/how it was employed by health professionals with patients. Opinions about information content and ease of use were also sought. The responses to these questions gave a good picture of how the kiosk was integrated into the culture of the host organisation. Size of hospital and surgeries were coded separately into three groups: small, medium and large. A small surgery was one with a patient list of under 3,600, a medium size as having between 3,601 to 9,100 appointments per week and a large surgery as having over 9,100 appointments per week. A small hospital was defined as having less than 115 beds, a medium size hospital between 116 to 599 beds and a large hospital as having over 600 beds

Geo-demographic data

These data were sourced from UpMyStreet[3], a leading digital local area information resource in the UK created by a Digital Media consultancy. Data were collected by entering location postcodes into a search area and extracting the data from the returned pages. Geo-demographics were available for 53 kiosk locations. For all the data from UpMyStreet, except location house price and Acorn category, variables were pre-categorised into three groups: high, medium and low, with little explanation of the categories. For example, the variable 'Locations likely to have mortgage home-owners' was pre-grouped into three groups: areas having a high likelihood, an average likelihood and a low likelihood. ACORN is a geo-demographic classification of residential neighbourhoods, there are 6 categories, 17 groups and 54 neighbourhood types. This analysis used the 6 category values only, and lower values represented wealthier neighbourhoods. Table 2 lists the variables collected by questionnaire, and from UpMyStreet.

Table 2 *Independent variable included in kiosk studied*

Geo-demographic Data	**Kiosk Variables (Questionnaire)**	**Kiosk Variables**
Location house price	Poster at locations tells patients about kiosks	Location type
Acorn Category (6 categories of residential types)	Leaflets at locations tells patients about kiosks	Geographical location
Locations likelihood to have children aged between 0-4 years	Patient told verbally by medical staff	
Locations likely to have mortgage homeowners	Patient told verbally by receptionist	
Locations likelihood to have two car households	Kiosk demonstration sessions	
Locations likelihood to have unemployment	Word of mouth from other patients	
Likelihood of share ownership	Doctor will use kiosk together with patient	
Likelihood of ITV viewing	Health professional shows patient how to use kiosk	
Likelihood of households having earnings of 20,000+	Receptionist shows patient how to use kiosk	
Likelihood of microwave ownership	Leaflets are also provided	
	Printouts from patient information system such as INIS	
	Size of location, in terms of number of patients on books	

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[3] http://www.upmystreet.com

Figure 2 *Variations in kiosk use, number of screens viewed per hour, throughout UK*

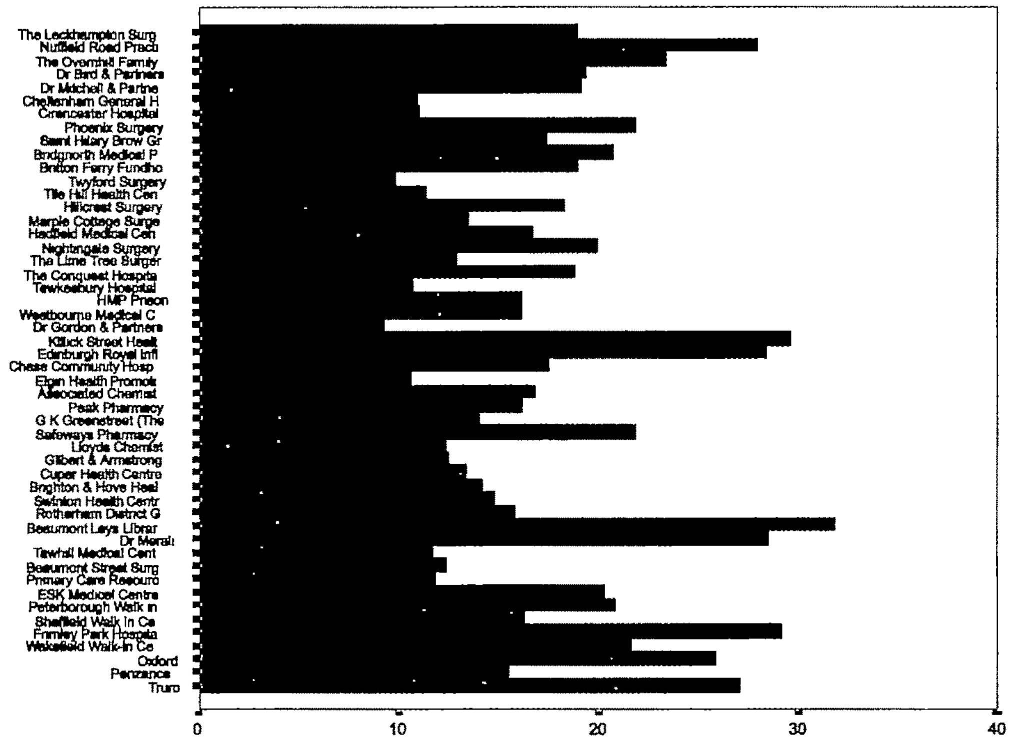


Figure 3 *Kiosk use by gender*

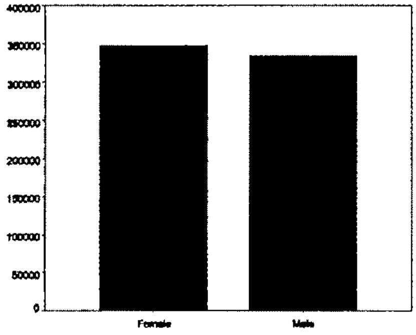
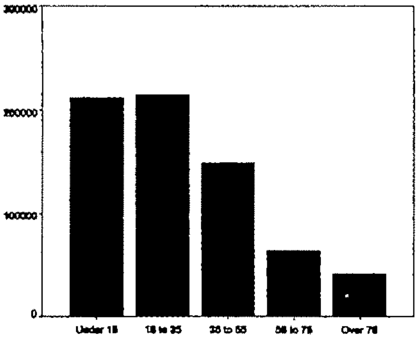


Figure 4 *Kiosk use by age*



Results

Kiosk use does appear to vary enormously – as Figure 2 demonstrates. What follows is an attempt to uncover the key determinants. It does not seem to be a function of gender. Females used the system a little more than men did, but there was not much in it (Figure 3). With regard to age most users are aged 15 and under and aged between 16 to 35 (Figure 4). The elderly, plainly major recipients of the health service, and to whom kiosks are specifically targeted, turn out to be low kiosk users.

If we run gender and age data across type of kiosk location we get interesting results (Figures 5 and 6 respectively).

Figure 5 *Kiosk use by gender and type of kiosk location*

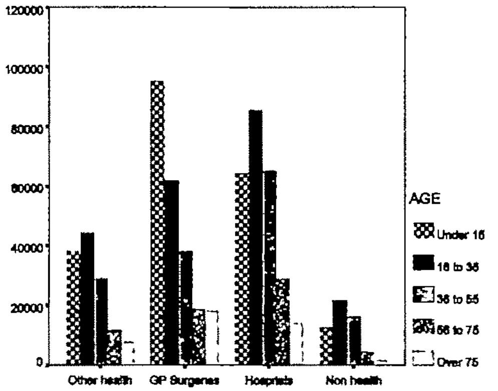


Figure 6 *Kiosk use by age and type of kiosk location*

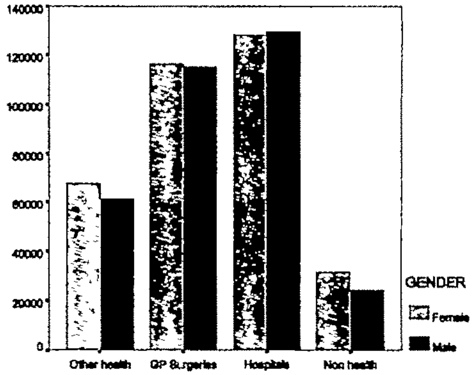


Table 3 *Estimated coefficients of fitted regression models*

	Models					
Variables in model	**Users per hour**	**Use per hour**	**Print per hour**	**Page time**	**Session time**	**Number of session pages**
Earn 20,000+					18 97**	
Mortgage	-0 20†					
Acorn value						-0 29**
Aged 0-4 year olds	0 51***	3 64**		-1 58*	-27 66**	
ITV Viewing				-1 47*		
Microwave ownership						0 41*
Word of mouth						0 93**
Health professional helps patient	0 36*			1 76†		
Leaflet about kiosk	-0 31*	-3 88*				
Receptionist helps patient		2 57†	0 14*			
Verbally by medical staff	-0 30†					
Surgery location			-0 37***			
Other health location						-0 85**
Size of organisation	0 31**	1 97*				
R Squared	70	53	44	26	47	57
Levels of Significance (t-test statistic) †P<0 10, *P<0 05, **p<0 01, ***p<0 001						

Gender distribution was much the same over kiosk location types, however there was a noticeable increase in use by women in non-health and at other health sites.[4] There were greater differences in age distribution of users over kiosk types (Figure 4) Thus, while 41% of pages viewed at GP surgeries originated from the under 15s, this group accounted for about 25% of pages viewed in hospitals. Why this should be so is not clear, but one clue does emerge from fieldwork interviews with medical professionals. Doctors and nurses show a marked difference in their use of kiosks, and in their attitudes towards them. Nurses appear to be far more pro-active in directing patients to a kiosk and using it with patients. They are also far more positive about the benefits of increased patient information. It may be that this involvement has skewed use of the kiosk towards adults, in the hospital settings where nurses are more likely to be on hand. Similarly, the presence of health professionals at or near these kiosks may have had the effect of suppressing both legitimate and inappropriate use by children.

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[4] chi=1039 df=3 p=0 000

Least squares regression was used to investigate the likely impact of a number of other variables on kiosk use. Table 3 lists the estimated regression coefficients for the six models. A comparison reveals a striking difference in what variables are significant. Size of kiosk host location, and how the kiosk is integrated into the culture of the host location, is a significant determinant of the amount of use and the number of users per hour. While Geodemographic variables such as the incidence of £20,000 plus earners, ITV viewing and microwave ownership seem to be more significant in explaining number of session pages viewed, session time and page view time.

Users (patients) per hour

The incidence of mortgages and age 0-4 year olds in the neighbourhood has an impact on the number of users per hour, as does size of organisation and whether a health professional helps a kiosk user The availability of a leaflet about the kiosk and if the kiosk was verbally recommended by medical staff are also significant, but surprisingly in a negative way. The variables together account for a high 70% of the variation in the number of users per hour between kiosks Size, aged 0-4 and health professional help for patients are positive coefficients and have a positive impact on the number of kiosk users. The role of host organisation's size seems obvious and we expect larger organisations to have a larger throughput of people and a larger pool of potential users.

Figure 7 *Average number of kiosk users per hour by whether a health professional shows user how to use the kiosk*

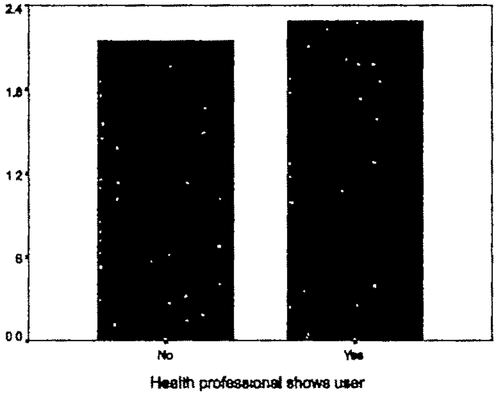
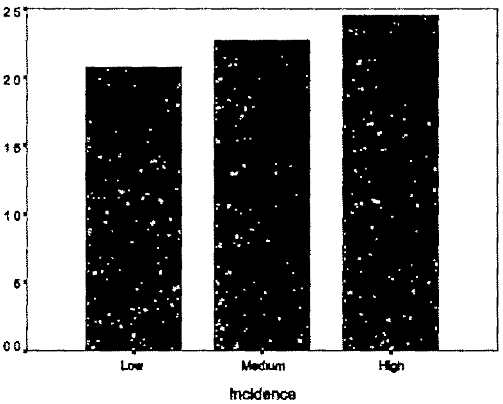


Figure 7 provides the evidence that shows that in locations where a health professional shows a customer how to use the kiosk there were a higher number of users per hour, as compared to kiosks where health professionals did not directly show patients. An alternative 'users' model fitted the variable 'receptionist helps patient with using the kiosk' and it seems clear that the locations where help is available to users will enjoy a greater number of users per hour Kiosks form a part of the medical environment and different locations will have different ways of integrating and employing the kiosk. Previous research has indicated that some users will have difficulty in using a touch screen kiosk and help for users to meet this will have an impact on use. A study of information outcomes of two Cornish kiosks [2] indicated that respondents who had difficulty in finding their topic were four times less likely to say that they had their question answered by the information found on the kiosk. Further qualitative research has shown that the touch screen area can at times be confusing. For example to activate to return to the last page viewed ('Prev screen') may not mean anything to those unschooled in the Internet and browser 'back' buttons. Therefore it comes as no surprise to discover that kiosk use did depend in part on whether the receptionist or health professional had shown the user how to use the kiosk

The proportion of 0-4 year olds in the area also impacted on the average number of people using the kiosks per hour (Figure 8). Areas with a higher proportion of 0-4 year olds tended to have a higher average number of kiosk users per hour. This may be because people with babies are more likely to go to the doctor.

The incidence of mortgages in the area is a negative coefficient and argues that places where the neighbourhood has a high incidence of mortgages generally has lower numbers of kiosk users This could be because home own-

Figure 8 *Average number of kiosk users per hour and incidence of 0-4 year olds in the neighbourhood*



ership is related to computer use and use of alternative health information sources, and perhaps mortgage owners are more likely to have access to a computer and hence may use the Internet instead of a kiosk Alternatively mortgage holders may be more healthy and hence less likely to visit the doctor. The provision of leaflets is also a negative influence suggesting that those locations providing leaflets about the kiosk tend to have less kiosk users. This is surprising, but the explanation may be that those places that provide leaflets might consider that this was sufficient and did not really attempt to integrate the kiosk into the workings of the host organisation.

Use (screens viewed) per hour

Four variables were identified as determinates of the number of kiosk pages viewed per hour. 'Age 0-4' and 'the size of the kiosk host' were identified as a positive impact on use and also 'the availability of a receptionist to help user'. Again the presence of a leaflet about the kiosk was identified as a negative stimulate of use. The model argues that larger host locations in areas with a higher proportion of 0-4 year olds and locations that do not rely on kiosk leaflets but on helpful staff who can help kiosk users, tend to have higher volumes of kiosk use. The four variables together account for about half the variation in 'use' or pages viewed per hour between kiosks.

The size in terms of patients of the kiosk location was significant in explaining both the number of users and the amount of use Figure 9 shows the impact that size of host organisation has on the average number of pages viewed per hour. Smaller host locations tended to have approximately 14 pages viewed per hour, while large organisations had approximately 22 page views per hour. The average number of pages viewed per hour for all kiosks was 18.5. Clearly places with a large throughput of people are likely to have a higher use. Size, as expected, was not found to be significant for time related metrics and the number of pages viewed per session.

Figure 9 *Average number of pages viewed per hour by host kiosk organisation size*

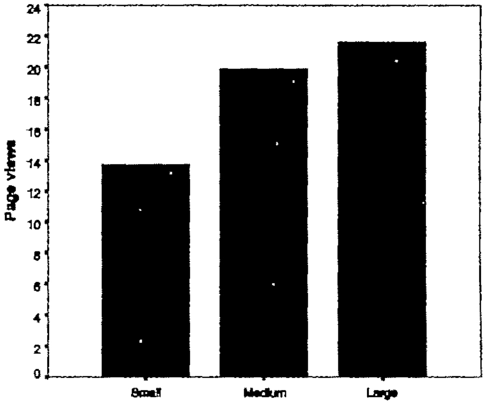
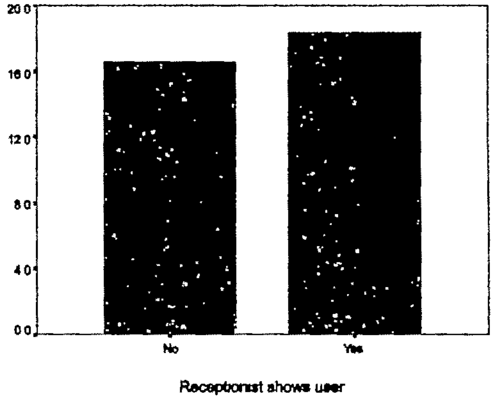


Figure 10 graphically demonstrates the univariate impact of the availability of a receptionist on the number of pages viewed per hour.

Figure 10. *Average number of kiosk pages viewed per hour by whether the receptionist shows user how to use the kiosk*



Prints per hour

Kiosks have a printer attached to them and on average 1.75 pages are printed per kiosk hour. Whether the user prints or not is affected by the availability of a helpful receptionist – sites with a helpful receptionist have a higher number of pages printed. Oddly less pages per hour are likely to be printed at doctors' surgeries compared to other locations. This is contrary to expectation. It was expected that users would print more in surgeries, as they would not be as time constrained as they are in hospitals, for instance. On the other hand, patients might have been put off printing because in surgeries they might be more conscious of people watching them. The two variables account for about 44% of the variation in number of pages printed per hour.

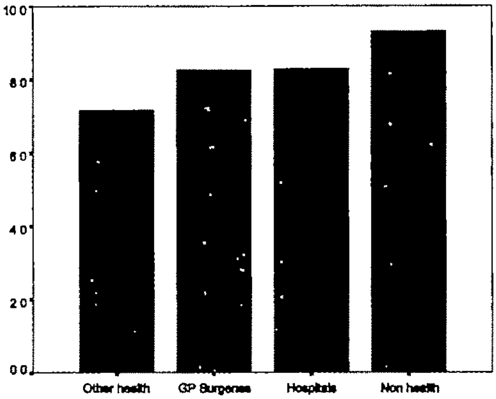
Time spent reading a page

The model explaining 'page time' is the least adequate and the three variables together explain little more than 25% of the variation. Oddly 'age 0-4' has a negative impact on page view time, as does 'ITV viewing'. The first might indicate a time constraint while ITV viewing might indicate an educational constraint and may suggest that the pages may be too difficult (medical) to read for some users. However, the fact that a 'health professional shows the user how to use the kiosk' has a positive impact. The presence of a health professional may impact on the user's positive attitude in using the kiosk and they may spend longer reading the information. Doctors interviewed indicated that one advantage of the kiosks was the specificity of the information, allowing patients to obtain material on their exact problem.

Session time

Session time also records a negative coefficient against children age 0-4, suggesting that users from neighbourhoods more likely to have children between 0-4 are more likely to have a shorter session time. Again this might indicate a time constraint upon people with young children. Interestingly those areas more likely to have a population earning £20,000+ are likely to have a longer session time. The univariate relationship of this is graphically displayed in Figure 11. This might indicate a previous IT experience and hence users might spend more time online because they know how to use the technology. Alternatively this may be an indicator variable of older users. Previous research [2] has shown that older users will have a longer session time as it takes them longer to navigate between pages. The two variables together account for about 50% of the variation in session length time between kiosks.

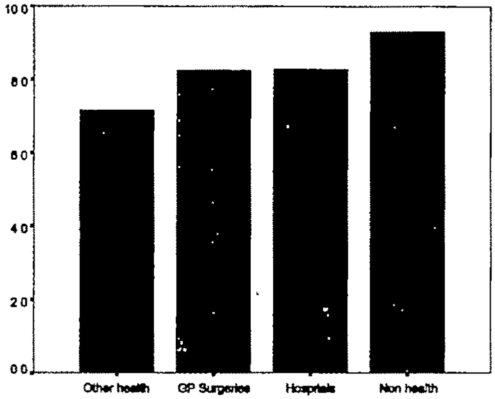
Figure 11. *Length of kiosk session in seconds and incidence of people earning £20,000+ in the neighbourhood*



Number of session pages

The model examining the number of pages viewed in a session includes the variables: heard of the kiosk by 'word of mouth', the incidence of 'microwave' ownership in the area, ACORN category and if the location is an 'other medical' location site. The surprising inclusion of microwave ownership may reflect an experience indicator, as most microwaves are touch screen controlled. There is evidence to support that prior use of technology, such as microwaves, will impact on kiosk use. Pearson *et al* [3] in a study of kiosk use by cancer patients found that those with a previous experience using a video, microwave and cash card were more likely to find a kiosk easier to use and would have a longer session time. The model also includes the ACORN categories as a negative indicator. The negative value of the coefficient argues that wealthier

Figure 12. *Average number of kiosk session pages viewed by type of kiosk host location*



users are more likely to view a greater number of kiosk screens. Wealthier users may be more likely to have previous IT experience and may find it easier to navigate between kiosk pages and screens.

Figure 12 gives the average number of pages viewed per session by type of kiosk location. User sessions conducted in kiosks situated in other health sites, such as pharmacists, tended to have on average about seven page views per session, while kiosk sessions in non-health sites, for example libraries, tended to have sessions of about nine pages. The average number of pages viewed per session for all kiosks was 8.03. Observation at fieldwork sites gives a clear indication as to why this is the case. Kiosks in pharmacies seem to be used principally by people waiting in a queue to collect prescriptions. Curiosity and the alleviation of boredom would appear to be the principal motives for many people who access various pages, as one might thumb through a magazine whilst waiting for an appointment. In libraries, on the other hand, potential users have already made the decision to visit an information rich environment, often to answer a specific query. They are, therefore, far more likely to be using the system more formally and over a longer time period.

Conclusion

This paper has demonstrated that kiosk use varies in terms of a number of key metrics Furthermore, it has identified the most important factors that will impact on this use The integration of the kiosk into the host organisation is significant, in particular the promotion of a culture where the staff help users will impact on both the number of users and the amount of use recorded. A number of indicator variables were identified It was found that neighbourhoods with a high incidence of mortgages generally have lower rates of kiosk use and it is thought that this group may have access to alternative sources of health information. Previous experience with microwaves and computers also has a positive influence on use of kiosks. Word of mouth was also important when it comes to actually using the kiosk and maybe more experienced users are helping less experienced users to get around the kiosk pages. A number of locations have active patient participation groups and a culture where there is support between patients. Another variable that was found significant was the incidence of 0-4 year olds in the neighbourhood This has a positive impact on the amount of use and number of users, but a negative impact on the number of users. We would expect families with young children to visit health centres more often than those without. Though there is not a section on baby health there are a number of pages on this topic. However, families with children may have more of a time constraint and this is reflected in the time use metrics.

This research highlights the fact that kiosks cannot be viewed as stand alone machines where users are simply left to get on with it Kiosks have to be seen within a context of the culture of the host organisation, and the type of neighbourhood in which it is located. It is important that the kiosks are linked to patients' concerns and interests by health professionals. Lastly kiosks in areas with a low computer literacy likelihood may have particular training issues to tackle.

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Mildly irritating: a WAP usability study[1]

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The Internet is poised to go mobile. Much has been said about the technology that will make this possible, but little about what potential users expect from WAP and a mobile Internet. This article is based on the experiences of 20 test users who participated in a usability evaluation. The users were given WAP enabled phones to use for one week The conclusion of the research was that WAP is not a user-friendly service. Connection times are far too long and even when the user is able to get connected to a WAP site their connection is often timed out even before any data is downloaded. When the test users were asked whether they thought they would have a WAP enabled phone within one year, 70% said no. However, when they were asked whether they would like one within three years the negative responses dropped to 20% So there is hope for the service. Indeed the research shows that there is a market for data services delivered through a mobile Internet and gives a strong indication as to what the users would want from such a service.

Introduction

'The text is too small, the menus unwieldy and the interface is dull. If you're unconvinced that WAP phones are the engine for the fastest social change in modern times don't worry, your not alone...' [1] was the verdict at a major conference held in London last year. These sentiments echoed that of the users in this study who found the impact of WAP to be somewhat underwhelming. Not for the first time there is a gap between the expectations of what technology is said to be able to bring and the reality of what is actually delivered In the case of WAP this is more than a 'Gulf of Execution' it is a chasm

If WAP, in particular, and mobile telephony, in general, are to live up to their promise they will have to overcome current technological limitations and, at the same time, rise to the challenge of user expectations.

Aims

This article examines the usability of WAP enabled mobile phones from the users' point of view. Furthermore, it does so with the intention of being able to identify key factors that will influence the future success and development of WAP enabled services. This entails looking beyond the functionality of the service to the data itself in so far as it is displayed to, and interpreted by, the user.

Scope

There is no shortage of articles that focus on the technical aspect of the service and the underlying enabling technology, but few that look at how the service operates from the users' point of view. This article aims to go some way towards redressing this. Where issues related to connectivity are looked at, they are examined from the users' perspective rather than a technical one.

The suitability of the mobile devices themselves is also a rich seam to mine – but these devices are being all but reinvented and redesigned on a daily basis. Tomorrow's phones will fit into the palm of your hand, slip into the smallest of pockets and have an increasingly wide range of functionality. This study looks at the phones only to the extent that the users themselves refer to their functionality – or lack of it

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[1] Based on a dissertation undertaken at City University 2000

[2] Currently working at the BBC as an online producer.

WAP and terminology

Although WAP is simply a protocol that allows mobile users to access data from a mobile handset, to the users studied here, in the usability evaluation, WAP meant rather more. They saw WAP as the whole mobile data service, as experienced in the UK. Since the users refer to it frequently in their comments there is a real risk of confusion in terms of terminology In an effort to avoid this, the reader should apply the broadest definition to WAP. Where the reader's attention to technical aspects of WAP is required its full description will be used.

Methodology

Users

Test users were selected on the likelihood that they would feature in the 'early majority' category of uptake. This is the group WAP must attract if it is it to have any chance of success in the future. In the light of the success of SMS (short text messaging) in the UK it is highly likely that this group will largely be made up of the younger population. Accordingly the test users were selected largely on the grounds that most of them were between 20 and 40 years old, that they had mobile phones and that they were interested in WAP phones but had not yet used one or seen one. A cohort of 20 users was chosen. Although this is a relatively small sample it is sufficient to allow broad conclusions to be drawn from their experience. Their average experience of the Internet was between one and two years. Half the group went online more than three times a day.

Data collection

The research was conducted during August and September 2000 The methodology is based on an observational evaluation of the users performing preset tasks on WAP enabled phones before and after they have spent a week using the phones. These tasks were timed. Questionnaires were also completed (before and after the week spent with the phones) to provide additional quantitative material. The bulk of the study's findings are expressed in the terms of the test users themselves. Their comments were recorded on audio tape during the debriefing sessions at the end of their week with the phones. The test users had been asked to keep a diary of their week. These diaries formed the basis of a debriefing when the users returned the phones. If they wished to quote directly from the diaries they were welcome to, otherwise they were used to jog their memories, when needed

Reporting the findings

The style of the usability report is derived from two distinct disciplines The first, as described above, is familiar to those versed in the evaluation techniques as currently practised by information scientists. The second approach gives much weight to personal testimony as a source in its own right. This owes much to the legacy of Studs Turkel and Tony Parker [2, 3, 4, 5, 6]. Although this report is by no means as comprehensive as their seminal works have been.

This somewhat unusual combination of approaches, familiar and somewhat less familiar to information scientists, is very much a reflection of the researcher's background as a television producer. In the course of a career stretching over ten years considerable experience has been gained in gathering testimony from a wide range of people. Techniques such as active listening and careful questioning have been honed to elicit testimony from individuals as naturally, impartially and accurately as possible.

Bringing these contrasting approaches together is an unusual step, but one that promises to provide a rich source of data which can be interpreted by the researcher and by the reader who is invited to read between the lines for themselves. In an attempt to facilitate this, the researcher's comments have to fulfil two functions serving as a formal analysis, and as a linking commentary, at one and the same time.

The users' quotes are all direct, as recorded on audio tape The extracts have been kept as close to the users' accounts as possible. Significant internal edits are shown as (...). In all other cases these are the words as spoken with only the odd preposition added to enhance narrative flow.

This qualitative data is underpinned by quantitative data drawn from questions put to the users. Data was also gained from the records of the time the users took to perform preset tasks. Questionnaires were completed in two largely structured interview sessions. The questions were framed in a variety of ways but most were closed and related to Likert scales, ranked orders or simple checklists. Values were assigned to individual responses and then collated in terms of the frequency with which the same response occurred. The data was then analysed using SPSS (Statistical Package for Social Sciences).

The observation of the users took two distinct forms. Firstly they were asked to perform preset tasks. The preset tasks were devised with two purposes in mind. The first was an attempt to see to what extent the users improved in efficiency after having had the phone for one week. To do this six tasks were set which the user repeated in the final session. The tasks were chosen with a view to providing them with information that was either locally or personally relevant to the individual user. Hence the users were asked to find travel information for their journey home, a local restaurant and a sports result from the previous evening. These were also features the researcher felt were important to the eventual success of WAP.

The second reason for asking the users to perform preset tasks was to get the users to a similar standard of familiarity with the phones and to ensure that they were confident using them. The reasoning behind this was that the researcher wanted to be able to look at the types of services that attracted the users. This would have been difficult if too many users failed to get to grips with even the most basic levels of WAP functionality. Since the public perception of WAP was poor, and expert opinion frequently pointed to the poor service offered to the users, this was clearly a potential problem.

Problems of connectivity and handset navigation were present throughout the whole study Indeed the very prevalence of these problems suggests that had the users not been given a basic grounding in the use of the phones they would have failed to get very far at all in the week that they had the phones. Users were shown how to use the phones, in the first instance, by the researcher. Basic functions (turning the phones on and off) were demonstrated by the researcher, as was the first preset task – finding the world headlines from the home portal. The user was then given the phone and asked to repeat the task. The objective was to build user confidence early and then to build on that. The subsequent tasks introduced key techniques one by one Task two (looking for TV listings) was an everyday task that was accomplished in much the same way as task one. The difference was that the user had to select a different option from the main menu and follow it through to get the information required (in this case what was on BBC1 that night at 8 pm). Task three (looking for the headlines on a second portal) introduced the concept of moving away from the home portal and choosing a different portal from which to search. Task four (looking for the headlines on *The Guardian* WAP site) introduced bookmarking. The user saw how bookmarks could be used and how they could bookmark sites for themselves. The fifth task simply asked the user to type in a WAP address (in this case http://somewherenear.com). This was selected because it was long enough to see differences in the individual timings and because it involved unusual characters such as forward slash. The objective of this task was to ensure that the user understood how to type in characters – something they would need to know when using the phones for themselves (there are often text boxes that need filling in before sites will provide the information being sought). This could have been left to the user to work out, but again the researcher wanted the users to penetrate as far into the services of WAP as possible. In the event all users were able to do this quite easily and in doing so the task provided an indication as to how long it takes to type in data. The final set task required the user to find the local weather forecast for that evening and to bookmark it. This summed up all the lessons learned in the previous tasks and was intended to help the users leave with their phones with a sense of confidence

The phones

Two different phones operating on two different networks were used in this study. The Nokia 7110e was chosen because it is seen by many as setting the benchmark for other phones. The Ericsson R320s was selected for its high technical specification and because it had only just been made available to the general public. The phones were bought, from the retailer, pre-configured to dial into the telephone network's own WAP portals. All portals (sometimes referred to as gateways) contained numerous WAP sites organised into categories such as News, Entertainment, Lifestyle etc. In essence this is very similar to the way homepages such as Yahoo or Excite are arranged on the Internet. The users' phones were also given three extra preset bookmarks: the *Financial Times* newspaper; *The Guardian* newspaper; Somewherenear (a local entertainment database); and a second portal, either Genie (BT Cellnet's portal) or Mviva (an independent portal provided by Carphone Warehouse). As noted above these were shown to the users and their use demonstrated.

The networks

Two networks were used – Cellnet and Orange. These are the second and third largest mobile operators in the UK. BT Cellnet claim to have the largest WAP subscriber base in the UK. Vodafone would have been a natural choice but they were re-vamping their WAP facility at the time of the study.

The phones and the networks

It was hoped that some comparison could be drawn between the different phones and the different networks. However, the vagaries of connection times and frequent loss of connections during a call were so common that any comparison between the relative advantages of either phone was difficult to make with any certainty.

The timings of the preset tasks

A last word about the timings yielded from the preset tasks. These timings were subject to considerable variation owing to the operation of three critical variables: the user's ability; the connection speed at that particular moment; and the software inside the handsets. With this in mind some caution should be exercised when considering the data obtained.

Results

The structure of the results section follows, to a large extent, the users' experience of using the phones in the order that they themselves experienced it. That is from trying to get connected to downloading the information they were looking for.

General impressions

- 40% cited slow connections as the most disliked aspect of WAP.
- 25% cited lack of depth of content as the most disliked aspect of WAP
- 65% cited access to news as the best aspect of WAP.

The users' overall impressions of WAP were largely negative. Accounts were dominated by expressions of frustration, of long journeys leading to dead ends and the poor overall quality of data. Fundamentally connection times were too slow and the data quality too variable for the users to get very much pleasure from WAP. However, while users were quick to criticise WAP, they still identified aspects of the service that worked well for them or that were at least on the right track.

These comments were backed up by the users' answers to questions put to them at the beginning and at the end of their time with the phones. Slow data connections were the most disliked feature of WAP, followed by lack of depth and the uneven quality of data. On the plus side users singled out access to news as the most liked attribute – even though they were often not happy with the quality of data that they found.

Before looking at the experience of the test users it is useful to get a sense of what the users were expecting. Even though none of them had had direct experience of the service they largely shared a common view.

Great expectations

- 75% of the test users thought WAP gave mobiles access to the Internet.

WAP was aggressively, if not seductively, marketed by BT Cellnet as a means of surfing the Net. But surfing the Net was never really on the cards. The effect was the creation of a market for a service that did not exist and a consumer base whose expectations simply could not be met. They were always going to be disappointed

> **Lionel:** The advertisements are that you can get the Internet on your telephone. And that's why I expected to get the Internet on my telephone. Of course I did not expect it to be coloured with loads of pictures and stuff, but I did expect to get the same amount of information that I could get on the Internet, despite the fact that it would take longer and I would have to scroll through something. I expected to get on the Internet, which I don't feel I did.

The first barrier the test users had to overcome was to get connected. This proved neither easy nor reliable and all too frequently took longer than the users were prepared to accept.

Connectivity and download time

- Time taken to retrieve news headlines 1'16 (1'03).
- Time taken to check local weather forecast 2'42 (1'55).
- Time taken to find television listing 2'44 (1'37).

The timings given above are the mean times the users took performing set tasks given in minutes and seconds. The figures in brackets give the time taken after one week using the phone. Although there is an improvement over time it still took a long time for the users to get the data – if they managed to get it at all (see Table 1).

This was the single most frustrating aspect of WAP. Time after time connections failed to materialise or were cut short before the requested data could be downloaded. This is clearly demonstrated by the difficulties the users had in successfully completing the preset tasks They were given a maximum of five minutes to complete the task successfully. The nature of the tasks varied from getting the world news headlines or finding the local weather forecast for that evening. The full results are shown below. User success rates (in terms of finding the information they were looking for) fluctuated between 70% and 95%. Surprisingly, there was no significant improvement in success rates after the users had spent a week with the phones. Indeed, sometimes, their performance was actually worse.

News sites were popular with the test users and most portals put 'News' near the top of their main menus. So, on the face of it, retrieving the news headlines seemed a simple task to set. However the users found this to be far from the case. They were asked to find news from three different sources. First, when they were given the phones and, again, when they returned them The users were given up to five minutes to find the information at which point they were timed out.

Table 1 shows that, on average, it took the users about one minute to access the news headlines. There is a clear, not to say dramatic difference, between the minimum and maximum times taken both when undertaking the task for the first time and again for the second time, a week later. However, it is difficult to interpret this since the connections can have such a dramatic effect on the timings. It is somewhat surprising that the users were so poor at working through a different portal This suggests that they tend to follow tried and tested routes rather than explore. Overall the ability to find data quickly is subject to dramatic variation – no matter which preset tasks are considered. This characterises the usability of WAP itself.

Connectivity is a key variable and the source of most of the users' negative comments and had a major impact on their enjoyment of the service The users' diaries frequently included detailed accounts of the paths they had chosen when looking for data and the problems they encountered on the way

Table 1 *Time taken by users to complete preset tasks*

Task	**Successful users (% of total users)**	**Minimum time (seconds)**	**Maximum time (seconds)**	**Mean time (seconds)**
Time taken to find world headlines from home portal	20 (100%)	36.0	189.0	76.3
Time taken to find world headlines from home portal one week later	17 (85%)	25.0	158.0	63.5
Time taken to find world headlines from different portal	19 (95%)	30.0	126.0	65.2
Time taken to find world headlines from different portal one week later	18 (90%)	35.0	280.0	113.9
Time taken to find headlines from *The Guardian*	19 (95%)	26.0	96.0	52.8
Time taken to find headlines from *The Guardian* one week later	19 (95%)	24.0	177.0	46.5
Time taken to find local evening weather forecast	18(90%)	54.0	299.0	164.3
Time taken to find local evening weather forecast one week later	14(70%)	49.0	270.0	114.9
Time taken to find a TV programme	20 (100%)	82.0	242.0	158.6
Time taken to find a TV programme one week later	17 (85%)	51.0	186.0	97.1
Looking for a local restaurant	16 (80%)	68.0	278.0	137.9
Looking for local travel information	7 (35%)	39.0	262.0	152.3
Looking up a sports result	17 (85%)	30.0	230.0	106.5

> **Philip:** I basically failed. These are the ones I tried Unwired Sport I was unable to connect. I then tried Genie XY, kept getting an 'internal server error' I was unable to connect to Mviva which would go through saying connecting then it would say 'loading' then it would keep loading, loading, loading and then it said 'connection timed out'. I then tried FT com, which is one of my bookmarks, and then I got 'downloading stopped due to time out'. *The Guardian* I could not access last night due to an 'internal server error'… I was quite angry about all that.

> **Arthur**. The next night I sat down to get the television… that took eight minutes – to get the TV, which is useful but incredibly slow. It would have been faster to phone up a friend who's got a television book – and cheaper

> **Ruth** It just seemed to take a long time so I would spend a lot of time waiting for it to connect to a site and then when you got something you had to press 'more' if you want more information because they are such small pieces of information on the screen. So something that you would expect to take five to ten minutes takes twenty minutes.

Error messages

The users were universally unimpressed with the quality of the error messages that came up on screen when a connection was lost or dropped.

> **Anne:** Looking up other things I got 'internal server error'. I found it a very, very unhelpful message Not quite as unhelpful as the time when you are following instructions, clicking on the 'yes' button and the up and down keys only to be told that you've got 'an error in typing' when you haven't done any typing whatsoever. 'Please try again' that was a very annoying message. 'Internal server error' doesn't tell you whether it's a problem of what you've done on your phone or whether it's a problem with the site that you are trying to access.

Some help was at hand for the users with the Ericsson/Cellnet phones – if they managed to find it. In the event only one of the ten users who had one did. But that did not necessarily make him any the wiser.

> **Lionel:** I found the site Formula1.com. I am going into it. Excitedly went into it and it said 'internal server error'. So I looked up what that meant and it said, 'digest is too large for device'.

Some sites did tell visitors that the site was temporarily offline. Whilst this is a step in the right direction it is not in itself a solution. Users can easily spend two or three minutes getting to the site which means they will have spent up to fifteen or even thirty pence to get there. This points to a fundamental usability issue Users are divided in terms of the quality of data they expect, but they share the expectation that they should be able to get it quickly.

> **Jess:** I expect speed I have an ISDN line at home and I expect it to be quick. They will completely lose me if they disappoint me with that. And I think with WAP I think it is even more important that they're quick because I think this phone bill is costing me more than my phone bill at home and if they are taking me down dead ends I will get really angry and I won't go back

Until an acceptable level of service is provided across the board, the user is destined to remain very frustrated. But there is more. In the absence of a help facility (a long established principle of usability for the Net) the users are left to fend for themselves. The lack of information or assistance can encourage idle hands to try and hurry the machine up.

> **David:** The other thing, and the Net does this very well, is that you really don't know whether it's thinking or not. You don't know whether it's crashed or not. You don't know what it's in the process of doing. They really need to solve that. For someone like myself, who is incredibly impatient, there is nothing worse than not knowing what's going on… and I think possibly a large percentage of the mistakes are made where the user, out

> of sheer impatience, hit the button another time and confused it

Sometimes the phone is waiting for the user to input more information, but does not make this clear to the user. Often the reason is that the phone is waiting for the user to enter information into text boxes that are out of sight. They can only be found by scrolling further down the page – but there is not always any indication that there is any more text to scroll down to.

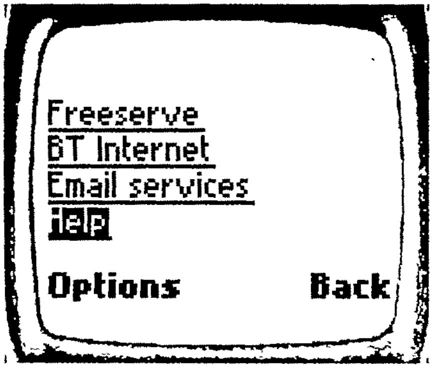
> **Jess**: I didn't find it that intuitive because I kept on missing out on commands further down the page. I think that was all part of me getting used to scrolling and checking that there wasn't something further down the page.

In fairness, Ericsson/Cellnet phones do displa an arrow on screen to indicate that there wa more text to be found But the underlyin point is that WAP providers should pay muc more attention to providing prompts for th users. Messages such as 'pick from here' c 'enter text into all three boxes' would go far t helping the users navigate successfull around such a small screen.

Cutting down on the opportunity for user to make mistakes is vital. One WAP site develc per notes 'in mobile phone interface desigr

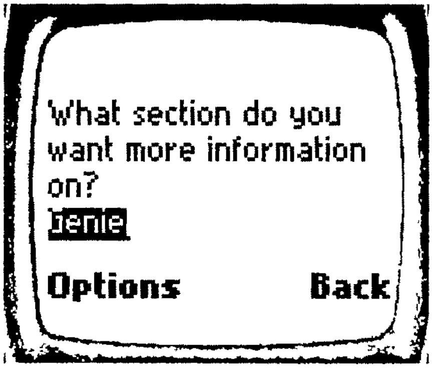
Figure 1. *Genie's help function*

This is the help option on Genie's main menu Located 'conveniently' at the end of a long four-page scroll



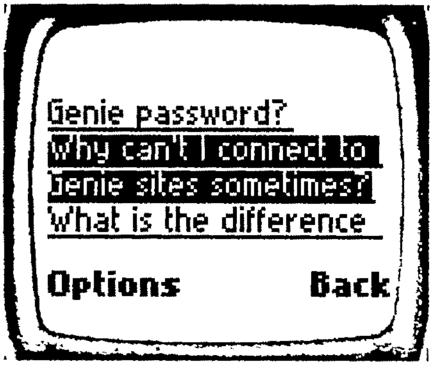
Freeserve
BT Internet
Email services
Help
Options Back

The first screen that comes up appears as below



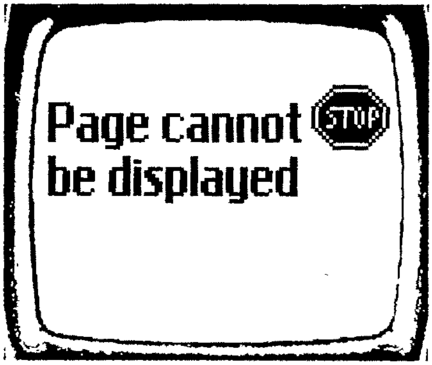
What section do you want more information on?
Genie
Options Back

Scrolling down a list of preset frequently asked questions presented the option highlighted below



Genie password?
Why can't I connect to Genie sites sometimes?
What is the difference
Options Back

This was the result!



Page cannot be displayed

every click loses half of your users' [7]. His solution is to provide selection lists as often as possible, this cuts down on the potential for error inherent in asking the users to type in too much information themselves

Another useful, if not vital, facility would be the ever-present availability of a help button Leaving users high and dry with nowhere to go is bad for business. However, this function is sometimes offered to the user on some networks but with less than reassuring consequences See Figure 1.

Labelling

- Rarely will the users be willing to return to a site that disappoints – if they are lucky to find it in the first place

> **Mary**: I just wonder who invents the labelling and whether they actually do trials with anyone Because it's not very clear to me what I will get when I press a certain item.
>
> **Jess**: I know you don't want too much on a page because you are constrained, but it would be useful to have a short maybe three word command saying type word here or something like that. I did find it irritating that I would go round in circles, even after I'd used the phone for a few days I'd still be making the same mistake just because it wasn't flagged up .. and also it would be really useful if there is more information on a page. Give me an arrow that tells me that there's more below or that you need to fill in three search criteria, bang, bang, bang – more instructions.

The message is that portals and WAP sites should adopt a straightforward approach to the way they construct their indexes and word their labels.

Going backwards

- The back button has become a fundamental part of the Internet. WAP users expect this facility too

All too frequently the WAP users were faced with dead ends or error messages that blocked their path. Instinctively most of the users looked for and found a back button But they were not always able to retrace their steps. Sometimes they had to wait to be connected, just to go back one step, other times they simply were not able to go back any further or were forced to go right back to the very beginning

> **Charlotte**: Mildly irritated having to wait to connect to service when you are going backwards. It seems reasonable when you are going forwards, but when it is going backwards it should have remembered the page before.

If the users did manage to get back they often found that they had to start all over again from the top of the page.

> **Jess**: When I've tried to go back and gone to the wrong place its irritated me intensely, especially if you've scrolled down six or seven news items and you've clicked on one of them When you go back it takes you back to the beginning again and in fact you've already seen that the first six or seven are not ones that you want and you want to go further.

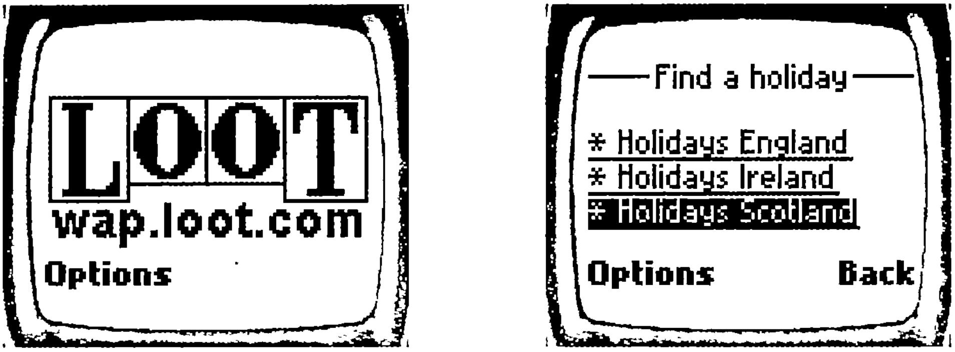
Bookmarks

- One in three bookmarks were sports sites.
- One in five bookmarks were entertainment sites.
- One in four bookmarks were news or weather sites.

The users were keen to bookmark sites they liked; indeed they generated over 90 bookmarks between them. And the sites stored were often ones that had a common principle – their design was kept simple. Here are the users' thoughts about two such sites. The comment below refers to the LOOT WAP site (a listings service) part of which is shown in Figure 2.

> **Anne:** It just says find a car/find a home/ meet somebody/find a holiday. Place a free ad. Terribly clear instructions. . So press to find a holiday and again holidays

Figure 2. *LOOT WAP site*



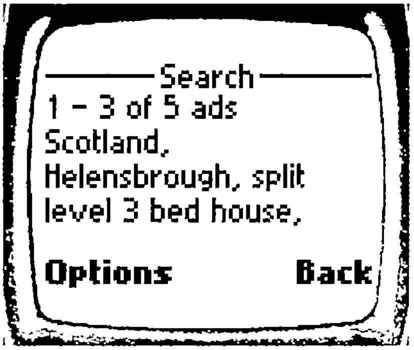
Loot's splash page

LOOT
wap.loot.com
Options

First page of holiday menu

——Find a holiday——
* Holidays England
* Holidays Ireland
* Holidays Scotland
Options Back

Result of clicking through to Holidays Scotland



——Search——
1 - 3 of 5 ads
Scotland,
Helensbrough, split
level 3 bed house,
Options Back

> England holiday Ireland holiday Scotland holidays . again terribly clear.

A new television series, Big Brother, gained cult status during the time of this usability study. Based on a Dutch series, Big Brother began to spill over into other media, including WAP.

> **Jess:** I was lucky. The first thing I clicked on to just got me hooked which was Big Brother. It was something that I was already quite interested in but, as a first thing to look at, it was really encouraging. I thought wow this is great, because it's a good site, you've got news, you've got biographies, and it didn't have any of these circular references or search things that you needed to put in, although you could search the archive. The news was clear and easy to read, biographies were good and I was surprised how quickly I was flipping around it. There were only a simple number of things you could do. You could look at 'today's news', you can look at the 'biographies' and you can look at the 'archive'. And because it was nice and simple I knew where I was all the time and I was really comfortable in there.

Reading the data

This section examines the main points made by the users in the context of the actual site they were referring to. For ease of reference the comments have been put together on the basis that they refer to the same category of sites. However, to a very large extent the points made in one group can be applied to the others

The test users were divided in terms of being at ease reading text from the small screens. Some took to it more quickly than others. A few never got to grips with it at all. The users also had somewhat mixed opinions in terms of the depth and structure of information they expected to find.

> **Anne:** Interestingly I was not so annoyed by the size of the screen as I thought I was going to be It just carries four or five lines of text. I did not find that too annoying. Far more annoying is that they have not re-purposed the information to work on that size of screen.

The test users were divided in terms of how much detail they wanted on an individual basis. But taken together the message is clear:

- clear menus drilling through to the right category;
- short headlines;
- short summaries;
- longer text available with page length given

The users who did succeed in getting the news had considerable differences in opinion in terms of how many lines of text they wanted given over to stories themselves. Some sites provided headlines, which led to pages and pages of story; others settled for a headline and a short summary. There seems to be a need for both from the users' point of view.

> **Anne:** I do not want to read the full story. What I would like is specially written sound bites or journalist pieces for the WAP so you get a properly crafted headline with just the bare minimum facts that would take about a couple of screens or three screens, where you do not have to press continue and have to wait for another thirty seconds to wait for it to download. I don't want the whole story, I want a very brief update.

But brevity can lead to the newspaper's identity being lost.

> **David** Went to *The Guardian* and the *FT* for the headlines for the news. I wrote down here I kept thinking of faster and more pleasing ways of getting the news. There was no real difference. The *FT* and *The Guardian* you would have trouble finding two more different papers, if you actually printed out what I was reading you would never have been able to tell it was *The Guardian*. It is news as opposed to newspapers.

This is a problem for news providers. Branding is as important to them as it is to the users. However, this is difficult when the copy has to be short. The solution is perhaps to develop a more sophisticated style that is brief and to the point at the top of the hierarchy, but which allows clearer branding to emerge further down to be found by the user who wants more detail.

> **Jess:** When it's the right piece of news I am quite happy to have a piece of news and I will scroll, and I will scroll, and I will scroll. And then at the bottom, as long as it tells me one of however many, I know how many more there are and if it's something of interest to me I will read them all You know if the first page has been good. Where there were ones where there was a comment there would be just the headline at the top so you would understand what the article was about and the comment itself was really quite brief so that was literally maybe two or three flicks of the scroll thing – much shorter than the article and I did like that variety.

Demand for news was not restricted to serious issues. Sometimes the news leads to unexpected sites.

> **Anne:** I noticed 'Gossip' and I went into 'Gossip' and I thought that that was quite a fun function I don't buy a tabloid newspaper and you can see that you might just log on and get a bit of gossip So I looked about Madonna and her baby and it also seemed that that gossip had been written for the WAP. So it was just little sound bites One little heading and then there was a read, which you click on It's not downloaded from *The Guardian* or something like it; it's not a story just a little bit. And I think that was quite good, I would access it again.

Financial information

There is a healthy demand for financial services. Certainly many of the users took an interest in basic financial news about stock movements. However, the current WAP sites failed to please in all but the most basic particulars.

As with the news, users want quick access to basic headlines and the ability to go deeper if they want to.

> **Anne:** It would be interesting if I could be able to click the share price to find out a little more about the actual company So making that link. I wasn't able to do that. I actually went in through FT.com and that did not have a link into actually giving you information about that company That would involve linking into some kind of database. I presume they could do it. It would actually be quite useful.

There is a clear need here but the data has to be up to date and be flexible in terms of the amount of detail on offer.

> **Jess:** I put in a client name and found latest articles and it was great, it was really good. And I liked also, in terms of content, if it was a longer article you'll get to the bottom of the first page and it will say one of three so you'll know how much more there is to come, which is great. And that was really useful and I used it again the next day when I was waiting to go into a meeting and I thought I would just go and check up on this client too. I got 'page not found' a few times but it didn't put me off because I really liked the site, I just tried again I wrote 'this is a really useful succinct site for business'.

> **David** Decided to try the *FT*, looked up Group Chez Gerard. You then have a choice between 'up to date information', 'full articles' and 'archives'. I went for 'full articles'. First attempt was a server error. Second attempt was a server error. Third attempt I got through. And again I was really surprised at how out of date it was. We are not talking weeks we are talking months out of date and I know that because I track GCG and I know the articles that have been printed. So there was something that was at least three weeks old about the sale of some restaurants and it wasn't there Totally useless and I am not even a professional trying to get that information.

Financial services and banking services are potentially important applications for future WAP services. But what is currently on offer is just too basic.

Sport

- Sport was the most popular category of bookmarked site.

Sports information is potentially a 'killer' application for WAP. There is considerable demand amongst users for up to the minute information on games in progress and for after the match details. Providing imaginative sport sites should deliver users to the networks in the hundreds of thousands.

> **Andrew:** This being Tuesday with football going on I then nailed it four times between 7pm and 9.50pm, looking at scores Each time 'football365', each time live scores bit seeing what the scores were and turning off two minutes each burst. Exactly what I wanted. Quick, you knew how to use it, ultimately one of the few reasons I would contemplate buying a WAP phone tomorrow is just because I think yes I want that.

But the service has some way to go. At present it is neither reliable nor up to date. And there never seems to be enough detail.

> **Richard:** Gloucestershire were playing the semi final and so as I was moving around I managed to bookmark Sky cricket live… and I probably hit that site about 30 times during the day. If there was a ball-by-ball commentary I would have done it. Joking apart it's only going to be in those sorts of circumstances that I would hit a site like that that often. You can get the cricket updates on Ceefax, if you need to you can ring up that number and get the Gloucestershire

> cricket line or whatever But it was kind of fun that day to keep on plugging in, but again all you got was the score and what I would have liked was the scorecard. You don't get that from that particular function, you literally just get the score

Round ups of the scores were also wanted by the users but they were frequently disappointed. Again there are great opportunities here for content providers Live reporting with statistical support would find a ready audience in the sports community.

Travel

- 65% of the test users were unable to find local travel information when asked to.

The users were asked to look for travel information for their train journey home as one of their new tasks when they brought back the phones. Although there was information available it proved very hard to find Travel is a big subject and there was a sense of confusion as to just what the category should contain. For the networks and content providers it turned out to be mostly about holidays.

> **Mary** What I find very difficult is that it makes me feel very stupid. I think that's why I get so annoyed. What I tried to do is find the right portal to start with. So you've got a choice there. I didn't know which one it's best to choose. Then the problem was not knowing what to look under because transport does not come up and it doesn't seem to go into 'News' or 'Travel'. Whereas on the radio you would get travel news so maybe it's a question of labelling.

Where the users were able to find travel information it tended only to refer to problems This did not help users whose chosen tube line was not specifically mentioned in the text. They needed to see explicitly that there were no problems on their particular line.

> **Richard:** It didn't have a Bakerloo line, it only had 'information found for the following lines and stations please select one – Jubilee line, London Bridge Station, London Transport, Piccadilly Line, Back to Travel'. So I don't know whether that means that there are no problems with the Bakerloo line because it doesn't report it It doesn't give you enough information about whether there is a problem or whether it's just covering those specific sites.

One user found a site that was very up to date and which was able to list trains that ran between the user's entered destination and departure points. It seems like a ray of light in an otherwise dark tunnel.

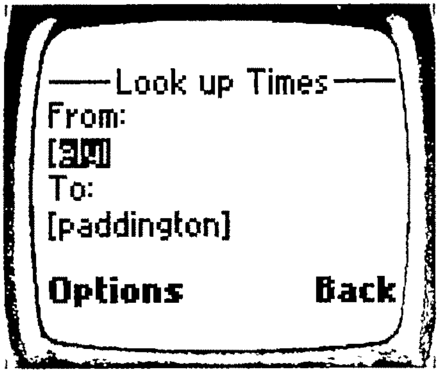
> **Anna:** I found this was the first useful thing – train service info – first excellent thing. It said service provided by Railtrack and you can type in the name of your destination and it's very easy. It says what date and it's got all the dates for the next two weeks and you click. What it doesn't give you is the prices and you can't book it. But at least I know that a train exists. I then tried to bookmark it. But again is it useful? Really you want a one-stop service I think. You don't want to find the information one place and then make another call to book it. If it had a facility being able to book online like you can on the Internet I think that would be very good.

This site is primarily a service that gives out rail information that can be downloaded by whoever needs it wherever they need it. It is not as good or comprehensive as a website, but neither does it set out to be so. However, it can be personalised so that the system recognises the user. To do this the user registers with the site and the system then stores details of the user's route to work and automatically tells them whether their lines are clear or not. Figure 3 shows how the site can be used to find train connections. In this case Ely and (London) Paddington were entered.

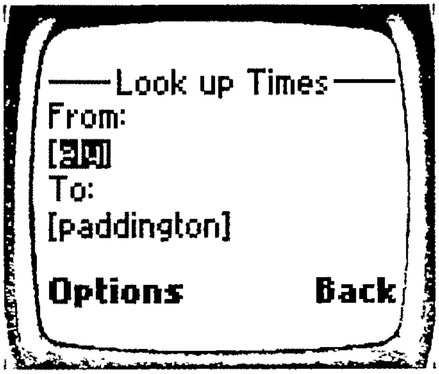
It was worth noting that in this case the choice of text entry is flagged in various ways. The page title says 'Pick from' and the options say 'Pick Placemark', 'Pick Major Station' etc. Some pages, as above, display the word 'Pick' to flag that a preset option needs to be selected This is both simple and clear to the user. The approach should be standard practice in an

Figure 3. *Train timetable site (Kizoom)*

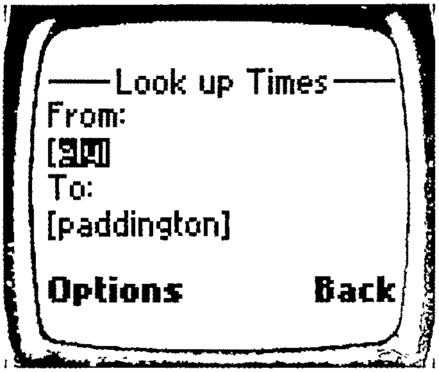
Having chosen the Train timetables option from the opening menu, the user is able to type in the places they wish to travel between


——Look up Times——
From:
[illegible]
To:
[paddington]

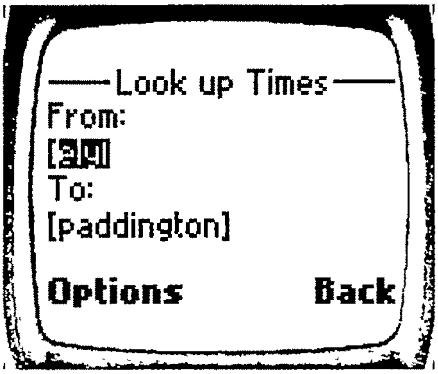
The next screen usefully says 'Pick' and invites the user to select the date from a scrolling menu This saves the user's time since they do not have to type in the data


——Look up Times——
From:
[illegible]
To:
[paddington]

Today was selected A further screen (not shown) asked for times of intended departure


——Look up Times——
From:
[illegible]
To:
[paddington]

The next screen appears as below. Further options (not shown) offer earlier and later trains


——Look up Times——
From:
[illegible]
To:
[paddington]

environment where screen real estate is so limited and the potential for error so big.

In time, the site should be able to deal with the additional functionality of being able to issue tickets. That is in the future. But even as it is, this is a site that really knows what it is doing and from which many other sites could learn useful lessons [8, 9].

Travel, of course, covers much more than just the journey home and there are some travel agents who have a WAP presence. Taken together they are a mixed bag, but constrained by the fact that none of them are equipped to actually sell tickets on the phone – until they are it is unlikely that they will make much of an impact. But, that said, there remain real opportunities for this kind of service.

Entertainment

- Entertainment sites were ranked third in terms of being bookmarked, behind news and weather.

Games and entertainment sites seem to be under-exploited by WAP There are some games sites but they do not provide the content the users wanted – games that they could play.

> **Charlotte**: The game play annoyed me because you couldn't actually play any games, you could only buy. With a site called Gameplay you should be able to

> sample games… I suppose that's misrepresentation of a site to me.

The potential range of entertainment sites is enormous. The following selections illustrate the range of sites that can currently be found on WAP. Predictably the users' experiences were varied

> **Anne**: I went into the mobile Internet on Tuesday and found a thing like Melody composer, which I thought would be quite fun. You go in and it has an alphabet. I went to the category P-S and I selected Scarborough Fair and it went to download and I couldn't get anything so that slightly irritated me. I was hoping I might get a bit of music I just felt that anything kind of complicated and it's just not going to work. So it tantalises you with things although they are never going to be of any use. It doesn't make me feel cheated as such; it just makes me feel unimpressed by it. People are wasting time and money on these things when they should make the basic things work.

> **Jess**: I did Click Music. I thought the news was really poorly written, it was like double Dutch to me, whether I am not young enough to understand but don't know. I thought the charts were interesting and I actually dialled up and listened to Mel B's latest single and I thought that was great, and I said 'Andrew! Andrew! Listen!' I thought that was good fun.

Most portals offer TV listings but they all seem to do the same thing – list the programmes channel by channel. This meant looking up every channel one by one and page by page a truly tortuous process.

> **Richard**· What would be quite nice is if you could press the time zone, say between 9 and 11, what's on. And on one screen you get BBC1, BBC2, and ITV. Now that, then maybe you're talking. Having to go what's on BBC1 tonight what's on BBC2 etc – forget it you'd wait until you could buy the evening paper or something.

Entertainment sites could prove very popular but, as these comments indicate, the users expect a high degree of added value.

Shopping

Many entrepreneurs see m-commerce as the next big market But in the absence of an agreed method of taking payment shopping by WAP is very much a thing of the future – but the users expect it now.

> **Anna**· I looked at 'Freeserve shopping'. Tried to buy a book. Their book choice was lousy under 'featured titles' Looked at the top ten books list instead. We got the four Richard Potter's and the Naked Chef at a very good price £9.49, which is well under half the price. Very cheap. Was asked for my WAP id and pass code Do I have one? No. Pressed help at that point. Told me that I would have to set up an account by going to streetsonline.com during working hours.

Lifestyle

Lifestyle is a category that seems to sweep up anything that does not easily fit into entertainment or anywhere else. Users found sites that demonstrated lifesaving techniques being listed next to ones that offered you the chance 'to meet a friend'. The one exception that the users found was food, which seemed to bridge both categories. WAP does not seem to know whether to file eating out as entertainment or as a lifestyle choice!

> **David**· Go through Genie thought I'd look up restaurants just out of pure interest I thought I'd look for Chinese restaurants – had an 'invalid address', thought fine. Tried every single other food that I could find. None of them worked. What's amazing if you actually go through Genie and look through the menus the list of foods is mind-boggling It's got Botswanan food – east Botswanan food. It's got a lot of food I had never even heard of but there's nothing behind it So it's either a site in progress or there's something wrong. But I can't see how there is something wrong because you get the list of everything. But it's literally as if someone gave you

> the index to a guide and them ripped all the pages out, but you are impressed by the guide because they really have absolutely everything! But there's nothing behind it so you feel a bit aggrieved.

> **Charlotte**: Menus.com. that was fantastic. That's where I could find the menus for my local restaurants and figure out what was for pudding at Leith's It makes me think about going out to restaurants more when you actually can see what's on the menu. I assume it's up to date… I didn't think of ringing Leith's to see if they had a chocolate bavarois tonight! But it got my taste buds moving, rather than a review of what the décor and service is like the food actually made me feel like God it's just round the corner, I could just go for a pudding! To a chocoholic like me that definitely could do. It made me feel like going out more. It would definitely if I was looking up two restaurants and looked up what was on the menu that day that would be the decider.

The two reviews above are for the same site. Each user accessed the site the same way – Genie/Lifestyle/Menu.com Further research into these sites showed that Nokia/Orange connected and gave the restaurant details whereas the Ericsson/Cellnet phone failed to connect saying 'wrong address'.

This illustrates a considerable challenge to the site engineer when it comes to WAP usability testing. WAP relies on the consistent interpretation of WML coded instructions to successfully complete a data transaction. But the software that underpins the site, the portal and the phone does not always interpret the code in the same way. This can lead to the simple display problems such as different layouts or total failures that result in an error message. The users, of course, do not care and nor should they. WAP sites should work properly or be removed from the scene until such time as they do function.

The users' verdict – overall usability

- 70% of users said that they would not have a WAP phone within one year.
- 20% said they would not have a WAP phone within three years.

> **David**: The advantages, basically, are a mobile Internet for a fraction of the cost of walking around with a laptop. The disadvantages are of anything that is mobile. It is very small and irritating to actually use and, at the moment, it is in its infancy, which means it's slow and liable to crash.

Users praised many aspects of WAP but overall the negative undermined the positive. This is clear even when the users are trying to be upbeat about the service. They also have ideas about what needs to be added.

> **Philip**. It needs some functionality. It can't just be an information service you are going to have to be able to communicate with it. The really useful things would be to be able to do last minute payments with it, booking tickets, booking train tickets, you are on the move, you want something done.

That is providing they could get past how it actually is at the moment.

> **Isabel**: I don't think it should be on sale because you have paid for the WAP package up front and then you are paying for the line time. If that was mine and I'd had it for a month I would definitely take it back to the shop at the end of the month and say inadequate service. I don't know if other people have had that experience like I've had or if they've had more luck. I think to have to wait two minutes at 10 pence a minute. So hang on, five minutes, it cost me 50 pence to get the TV listings. Most of those things I did I would say seven out of ten took me five minutes definitely, so that's 50 pence and a newspaper costs what, 35 pence?

> **Lionel**: It seems an incomplete service. It's like being on holiday in a half-built resort. The signs to the beach and other major tourist attractions are OK, but if you try and get to the tennis courts they haven't finished building it yet and the bar only serves beer, no cocktails.

Conclusions

The comments found in the section above, amount to something of a conclusion in themselves. The users' frustrations are clearly articulated and their basic needs made clear. Taken together they add up to a usability guide in their own right

In terms of the five attributes of usability [10] (learnability, efficiency, memorability, errors and satisfaction) WAP did not perform too well. WAP enabled phones are not that difficult to learn to use and, to a relatively large extent, once learnt the key functions were not easily forgotten But for higher levels of performance the story is rather different. Users encountered too many cul-de-sacs, lost connections and poor signposts to be able to get to grips with using the system itself with any real efficiency. Errors, rather than being 'few and far between', plagued the system In terms of being pleasant to use, user satisfaction was generally very poor.

There is a strong feeling that the users were never able to quite get over the fact that WAP is not the Internet made portable. Whether it was ever meant to be that is open to question. It is tempting to lay much of the blame for this misconception at the door of the marketing departments who want to exploit mobile telephony. Nevertheless there was also, at the same time, a clear demand from users for a portable version of at least some of the Internet. So what does that mean for WAP?

Some of the answers to squaring the current vicious circle that is WAP and creating something rather more virtuous can be found in this report. The users spelt out basic requirements loud and clear. Give me what I want and what I did not know I want, now! What they got from WAP was less clear

The phones themselves are not as big a problem as one might have imagined. The users accepted the screen's limitations and realised there has to be a trade off between portability and ease of use.

Poor connectivity is the Achilles heel of the current service. It will not be transformed overnight Until the arrival of GPRS, the networks, content providers and site engineers must do better when things go wrong Sites that are not working should not be online Users cannot be expected to pay their way through a series of links to a page that simply is not yet available or temporarily out of order It may be that an error default page, as found on the Internet, is needed. This could at least minimise the amount of time, and money, the user wastes.

eNavigation and labelling all too frequently resembled a dialogue of the deaf. On the one side, the networks and content providers offered long lists of sites and services providing pretty much everything a WAP user might want But to the users this was a recipe for disaster. The long menus required thumb-numbing scrolls. Categories in themselves were a good start. But once the user clicked through, the guiding role of the screen was often abandoned. This left the user with a bewildering array of sites that frequently were not quite, if at all, what they wanted. The result, a mildly irritated user slowly and surely becomes increasingly more fractious and disenchanted with the system as a whole.

It is clear that, as things are, mobile phones are not places from which to surf anything, let alone the Internet This is hardly surprising. The device was originally designed for the ear not the eye. In time, audio streaming could convert the material that is so difficult to read into sound. This is, after all, the natural medium to receive information on a mobile phone.

However, there are clear pointers as to how better to offer data for users to read. Offer the users clickable options that go deeper into the area the user wants to know about. This means thinking ahead for the user. Create search paths that make sense to the user. Too many paths seemed to be for the benefit of the witty site designer rather than the busy user.

Time on WAP is money, big money. The users do not thank you for wasting either. A site that is easy to mine and which presents its information clearly is one that the users will return to again and again. Sadly, such sites are rarely to be seen

Displaying data on a small screen is never going to be easy. But the users make the basic principles clear. Short openings that sum up everything that lies beyond. For news that means clear one or two line headlines. The source and date of posting should also be provided. This is as true for news as it is for a restaurant listing. WAP is not like the Internet in this respect Users do not bring trust to the table, quite the reverse. They must be given reasons to believe what they are reading.

In terms of depth, let the users go deeper if they want to (in which case tell them how many pages they are letting themselves in for). Most users, most of the time, are online for a handful of minutes With this in mind the data has to be easy to scan at a cursory level or quick to drill through. Certainly both facilities must be offered Lastly, the information offered for whatever reason cannot be simply lifted from a different media. Print or Internet copy does not transfer well to WAP The small screen makes scrolling or scanning all but impossible for the user to do with any sense of comfort.

Fundamentally, WAP is there to keep a mobile user 'up to data', so to speak This can mean news and useful information but it can also be rather more frivolous. Gossip about Madonna, or sites tracking Big Brother, were all seen as delights in an otherwise disappointing service. This suggests that far more attention should be paid to providing sites that can be explored in a handful of minutes whilst the user has a spare moment. Users, young and old, have escapist needs and WAP sites could be developed to meet these

Travel information, or the lack of it, brings into focus two very significant failings of WAP. These are the lack of provision of personal or localised services. WAP should be able to do more than entertain someone for simply a few minutes. This is where WAP should be able to make an impact. The current GSM network can provide a reasonably accurate geographical location for a phone, so localised information could be a possibility even now. But there is little sign of it. Providing the user with an unsolicited message that their usual tube line has just been stopped should already be a killer application rather than yet another thing to put on the wish list

Fundamentally, WAP should provide personal and locally relevant information, quickly, to a user on the move, but it is simply not up to this. There is a real sense that the service is offered with little or no thought as to why it is being offered and what it will take to get, and keep, people online. Many of the answers lie in the extracts above. Only when these basic needs and standards are met will m-commerce become a reality. There is no point in pretending that it is useful or even possible to offer banking services, or simple shopping opportunities, until the basic infrastructure is in place. The new operating system GPRS (when it arrives) will solve many of the underlying problems. But until the issues, identified above, are dealt with there is a real risk that the new faster system will simply deliver poor quality data more quickly This is something that must be addressed in the future development of site design. There is little doubt that these teething problems can eventually be overcome. It is just a question of when and whether it will be WAP that enables it.

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New information perspectives

Comment
The Guardian/Observer: information developments since 1998
Helen Martin

Libraries and open society: Popper, Soros and digital information
Lyn Robinson and David Bawden

Information and social quality
Yitzhak Berman and David Phillips

The future of the British broadsheet newspaper on the World Wide Web
Nicola Cowen

Aslib imi
INFORMATION MANAGEMENT

Aslib Proceedings is a long-standing professional journal of international repute, which has a large and wide subscriber base. The journal brings currency, authority and accessibility to the reporting of current research, issues and debates in the broad area of information work. Above all the journal wishes to provide research and comment in a form that is easily and quickly understood: a fresh, rigorous, but unfussy, writing style is what is aimed for. The needs of busy practitioners (and academics) are very much in mind. Articles are refereed to meet the need for accredited and authoritative information. To ensure that this does not result in an unacceptable loss of currency, articles are speedily refereed by the journal's large, eminent and multi-disciplinary Editorial Board (assembled for just such a purpose). In some cases they may be referred to an external panel of consultants. The journal's monthly publishing pattern helps in maintaining the currency of reporting. In consequence the submission of research in progress articles is encouraged.

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Comment
The Guardian/Observer: information developments since 1998

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Provides an update of the British Library funded project 'The changing information environment', which featured an analysis of Internet use at *The Guardian/Observer*. Desktop access to the Web has made a difference, but searching skills have not improved significantly Nor have attitudes to training or indeed library staff. In the light of events at *The Guardian/Observer* considers the status and future of librarians in the media.

Introduction

The Guardian/Observer featured strongly in the Internet Studies Research Group's British Library funded project 'The changing information environment: the impact of the Internet on information seeking behaviour in the media, 1997–1998' [1]. Since then much of importance has happened at these newspapers and this article describes exactly what in order to update the project's findings.

It was typical that just as the research study finished, *The Guardian/Observer* went live with its new Mac-based editorial system, QPS, which provided desktop access to the Web for all of editorial across both papers. As a direct consequence e-mail use exploded and is now the prime mode of communication within the building, including the Research and Information Unit (R&I) where staff use e-mail to pass on electronic searches of both Nexis and the papers' own internal archive. Web use soared too, though librarians noticed that their searching skills seemed to bring forth better results than those obtained by journalists (plainly some things remain the same). Indeed, such is the comparative ease of some of the searches conducted by library staff at the behest of reporters, that librarians have come to the conclusion that journalists must be being economic with the truth when claiming to have tried themselves. Either that or it would seem to negate some of the project's findings, which had pointed to increasingly sophisticated use of the Web by some of the papers' more experienced journalists.

The really big lesson to be learned, as indeed was suspected, was that access is all where take-up of the Web is concerned, and desktop access made all the difference to use. For Research and Information staff, the only solid group of web users at the time of the British Library study (with the obvious exception of the newspaper's website – new media – employees), the convenience of desktop access contributed to a change in their entire mode of working.

Commercial online ('oldline')

The move to the QPS editorial system had coincided with the beginning of the end of FT Profile (it was taken over by LEXIS-NEXIS) and the first thing to happen was a switch from the old and trusted 'Info' interface to 'InfoPlus', a system with which staff were less familiar and which, for various technical reasons, appeared on our screens in an eye-straining small typeface. As the collapse of Profile came ever nearer – Infoplus seemed to be unsupported – different hit lists would be returned on the same search and we grew to mistrust any research we conducted on the host. At the same time the new in-house archive was experiencing teething problems too, so staff turned increasingly to the new version of LEXIS-NEXIS Universe, itself equally unfamiliar. Yet paradoxically when all that was good seemed to be crumbling, the

Research and Development Unit came under fiercer instruction to cut costs on external hosts than had ever been experienced in the 15 preceding years. It was with some relief therefore that we could turn to the free and fast developing Internet. Needs must is always a good basis for honing skills. It soon became commonplace for R&I to e-mail sites to people, as well as furnishing database searches. Although staff had long offered and advertised an Internet training course, take up showed no particular increase; journalists, as ever, preferred to muddle through themselves.

Intranet

The advent of desktop access did put pressure on R&I to develop their intranet (ResearchNet) further. This intranet is one of three of what have come to be known as Computer Assisted Reporting (CAR) intranets that exist in the media world, i.e. an intranet that concerned itself exclusively with sites and gateways useful as research sites for reporters. It was content that was concentrated on first and foremost, an area where the Unit had a lot to offer and felt quite confident. Although in the early days R&I had compiled its own chronologies, this was soon eschewed for providing details of tried and tested gateways and sites, which were arranged under various subject headings, namely:

- Accidents and Disasters
- Arts and Entertainment
- Business and Finance
- Computers and the Internet
- Crime and Law
- Facts and Reference
- News and Media
- Politics and Government
- Science and Health
- Society and Culture
- Transport and Travel
- Wars and Conflict

These headings were then sub-divided into smaller sub-sections

Partly because no finances were obtained to fund the building of ResearchNet, partly because there was a complete systems overhaul imminent – and the Unit was unsure where the intranet would end up (either on Lotus Notes or an editorial intranet called Editnet), and partly because the R&I staff building the intranet were themselves fairly new to such skills and were experimenting, no particular software was used and all the HTML was done 'by hand' so to speak. This slowed things down since not everyone in the Unit had HTML skills. However, new recruits brought new ideas and more honed skills. It proved quite a learning curve for those people involved on the design side and staff were inordinately proud of the little moving icons that flashed and waved alongside our subject headings on our first attempt!

As time went by, however, attention turned to the concept of 'integration', a subject that much vexed *The Guardian* whose website offices are physically separated from the main building. Strenuous efforts were made to introduce the paper's journalists to the website (Guardian Unlimited) and create an interest in an area that some, at least, viewed with some mistrust. Similarly it was hoped that some of the culture of the paper based journalists would rub off onto the young and dynamic new media staff at Guardian Unlimited, in a world where 'branding', and quality branding at that, seemed to be the name of the game. Equally new media staff were invited into the main offices to sit on the news desk and work closely with reporters there. In this way it was hoped that the two lots of journalists, paper and new media, would get to know each other and understand each other's needs and deadlines.

To assist in the integration moves, R&I decided to adopt the design of Guardian Unlimited on ResearchNet. The idea being that it would help people when it came to finding their way around both systems. Out went the flashing icons to be replaced by a smart and sleek modular design in boxes of blues and black. Out too went extraneous material on surrounding restaurants and other 'office' type information, which we consigned to the then nascent corporate intranet containing data more usual to office intranets. It was felt that ResearchNet should take on a more serious tone. A site much more in keeping with a CAR intranet, concentrating solely on sites that would be useful to journalists for research purposes.

The home page now took on an entirely different flavour and allowed more self-promotion, which we felt necessary. An R&I logo was commissioned and this is displayed on every page with a prominent note on the home page that 'this site was created and is maintained by the Research and Information Unit'. Also on the home page is information about the Unit, who they are, what services they offer and current news about the Unit such as staff comings and goings. Down the left hand side are listed 14 questions under the heading 'what R&I can do for you' with clickable questions such as. Writing a book? Need Internet training? Need a sidebar? Another box was called 'Useful stuff' which contained: a monthly diary of world events compiled by R&I; Guardian and Observer Information (chronologies of main events and launchings of various sections of the papers); training guides, list of cuttings files and a useful section called 'tracking people down', which has numerous useful links and aids to do just that. Tracking people down is, of course, a prime journalistic occupation.

The home page also displays a set of quick reference links to sites that are used frequently – Yellow Pages, Directory Inquiries, Encyclopaedia Britannica, Multimap, currency converter, Internet Movie Database, and a web of dictionaries. There is also a 'what's new on the intranet' slot. Finally, following a request from the Editor that the Unit supply web links for articles in the paper, a 'web links of the day' section was created, linked to that day's news and enhanced with occasional 'specials' such as the fuel crisis or the US election. In these latter cases it was necessary to scan in relevant cuttings from the files if they could throw some light on the subject area. Many people, for instance, compared the treatment by police of striking miners in the 1984 coal strike with modern day fuel protestors, so a few cuttings from the miners' strike days were added as a link Former web links of the day are archived.

Although there are plans to search the intranet in the future it is not possible at the moment and so a site map was added to help navigation in the meantime. Most of the sites are clearly annotated, and detailed in order to help reporters choose the right one, pointing out the drawbacks and highlights of the site. A blue column down the left-hand side of each page indicates the library holdings in terms of relevant cutting files or books, as they relate to the sites shown.

ResearchNet had its origin in pre-web days (pre-web days at *The Guardian* that is) when R&I offered a pre-emptive service called libwir on the old Atex editorial system. This was a service that comprised mini databases on topics such as rail accidents (simply providing the date, place, number of people killed or injured) and chronologies on various other subjects – IRA bombs, or even trivial things such as lists of recent large divorce settlements, who had been in and out of the Priory and recent winners of the Booker prize. The kinds of things journalists need to know in a hurry but which can take hours of time to research at midnight, when you need a quick sidebar after the latest bomb has gone off and a slip edition is being hastily put together.

The difference then, of course, was that library staff used to compile these lists and chronologies themselves. R&I was well aware of the time and problems associated with keeping the growing number of chronologies up to date and, although a few of the more trivial subjects were transferred to the intranet – Rescued by Rehab (celebrities in clinics), Jailhouse Rock (pop stars in trouble with the law), Life in the Fast Lane (celebrity speeders), the decision was taken that most of the content would be Internet links to similar chronologies on the Web, albeit to sites which were reliable and maintained. Nevertheless a certain amount of housekeeping is still required to check that links work and that sites are not superseded by something better, something on which we could usefully spend more time, were there the time to spare.

One of the major regrets is that, having set the site up without support or money, there is no facility for evaluating the use of ResearchNet. The Unit had been lulled into a false sense of security by news desk staff, who reported using it daily and with great enthusiasm, only to discover that there was considerable confusion abroad as to the difference between Editnet, the editorial intranet on which ResearchNet sits and which also hosts the internal archive, the wires and

ResearchNet itself. Further investigation highlighted the fact that not only was there confusion but many people did not know what an intranet was.

The marketing problem had been anticipated and R&I held an open 'brown bag' lunch to demonstrate the site to anyone who cared to show up – fewer than 40 of the 500 *Guardian/Observer* journalists did. A bid was also made to demonstrate the site at a heads of department meeting held monthly by the *Guardian* editor, Alan Rusbridger – a web convert. So far these plans have had to be cancelled five times. Regular notices are posted on the two internal electronic notice boards (one for each paper) and a news desk demonstration was held at the end of January 2001 – this time at the journalists' request, which is the most hopeful development yet

In this respect the experience R&I have had with ResearchNet mirrors almost exactly the difficulties we experienced before in regard to commercial online and indeed the Internet. All attempts to promote, and train people for, the services have been dismal failures. Various means have been tried – approaching the individual 'desks' separately, posting notices on notice boards and subsequently the construction of ResearchNet itself, individual approaches to specific staff members, from the top down, the bottom up, via the news desk, via the personnel department, via the QPS training team Even when R&I finally figured on the induction course for new employees it was found that journalists simply skipped this item and failed to turn up.

The idea of a newer catchier title than ResearchNet was toyed with frequently, only with great difficulty resisting the acronym Randi (R&I = RandI). The Unit was left with the conclusion, yet again, that only compulsory training would work This is in fact what happens for the editorial system, QPS, and also for the few remaining LEXIS-NEXIS using journalists. But the suggestion that this should be extended to library training issues tends to be greeted with raised eyebrows The inference is that reporters will pick these things up as and when they need to. Given that the very same people were equally relaxed about compulsory training for FT Profile, even when there was office-wide desktop access to it and the resulting high bills, this is, perhaps, hardly surprising, if disappointing.

Conclusions

And what of the future of commercial online (oldline) in the face of the Web threat? Certainly, in an era of research intranets and the Web, internal archives and data exchanges ('Fleet Street' libraries daily exchange their electronic data free of charge, the one to the other, giving all titles access to not only the content of their own papers but others too), it is all too tempting to forecast its demise And remember that *The Guardian* was one of FT Profile's biggest and most satisfied users. Plainly the use of external commercial hosts has fallen but not by that much – a mere 10% in fact – since the introduction of our own internal archive This is probably because the data, other than that for *The Guardian* which goes back to 1984, only goes back five years and also because we do not have all the exchanged data online yet.

The need for aggregated/retrospective data and newspapers' dependency on other newspapers, particularly in the British media set-up, has scarcely diminished at all. External hosts have given way not so much to the Internet as to the data exchange, although it may be true that foreign papers, if they are available free on the Web, may be used in preference to, say, those available on LEXIS-NEXIS. This is largely because queries on foreign data tend to come in a different format to the more generalised queries concerning the British press, and usually centre round a specific article in a specific newspaper rather than the 'get-me-some information-on-the-fuel-crisis' type, or the 'when-did-so-and-so-say-x', which would be searched across several titles. If, for whatever reason, the data exchange suddenly collapsed our dependency on external hosts again would be almost undiminished

Where the Internet has triumphed appears to be rather in the area of books and grey literature – information that was rarely collected by newspapers in the first place, the very kind of information that can be made to sit easily on a research intranet. It is doubtful whether the Unit will continue with our hard copy versions of Hansard now that it appears free on the Web. I do not suppose we shall ever buy another set of Britannica. Multiple copies of books are steadily cut back. We turn more and more to KnowUK and websites for the kind of information held by reference books, whose currency we always found wanting in any case.

It has become traditional for librarians, certainly in Fleet Street at least, to examine every new information development for some perceived advance in their status, cheered on from the sidelines by academics. When one looks back to the days of cuttings and little else, it would be true to say that their status has improved. But not exactly in leaps and bounds. Guardian Unlimited, for example, albeit a highly successful brand, employs no permanent librarian on its staff, though one could indeed see openings for them. 'Information architecture' is supposed to be the buzzword and there are many sites whose information is quite impenetrable and which could do with the input of an information professional. Although there are examples of librarians employed in these kinds of roles it still seems far from the norm and one wonders if, as a profession, we are not in danger of having our clothes stolen yet again. The establishment of a new media course at the London School of Economics, which has an option entitled 'information systems' but does not seem to be aimed at wannabe librarians, seems to endorse this. The truth is perhaps that wannabe librarians are a rare breed. Most people, it seems, wannabe something they perceive as much more exciting – researchers, information architects etc. And if we find it occasionally difficult to define ourselves no wonder others have the same problem.

The Guardian, although an information provider, adopts no information policy. And if editorial management does not regard us as 'clerical' any more, one wonders if they do not, now, perceive librarianship as a branch of alchemy or the black arts. Something whose mysteries they know they ought to take time to get to grips with one day, because it may just prove beneficial, but which, in the meantime, they will simply view with the suspicion its practices and arcane language clearly deserve.

If one measures status by salary then the starting salary of a reporter is 50% higher than that of a librarian with similar qualifications – indeed very often the qualifications of the librarian are higher. The average journalistic salary is easily double that of most librarians at a similar stage in their career. If you measure it by influence then librarians would fall off the scale. Odd then that in a recent consultancy exercise at *The Guardian* librarians, unlike most journalists, sat on and contributed to many of the various representative meetings – an indication of their wide brief – yet merited two lines in the several hundred pages of final report. This is not deliberate or malicious and indeed it speaks of progress that librarians were invited at all. It is simply that people seem to find it hard to define our role and clearly we must share the blame for that failure.

Of course newspaper management works to tight strictures and it is not perhaps surprising that they view ancillary departments as possible cost-cutting areas, rather than ones of professional expertise. And one cannot under-estimate the influence of time, or lack of it, on a newspaper. Journalists work 24 hours ahead. Librarians with their long-term projects, be it with space or information policies, struggle to be heard in that kind of environment and are themselves bound by it. Journalists rightly consider themselves to be pretty good information experts as well and there is perhaps a grey area here.

However, at grass roots level, where relationships have always been mutually respectful, there is perhaps a chink of light, grounds for optimism maybe It depends on finding the time to grab people's attention. At a time when the world is changing dramatically for journalists (in the same way it changed dramatically for librarians with the introduction of online) they are subjected to tighter deadlines, more accountability, changing working practices, less and less time – they are perhaps more interested to hear about short cuts And in a world where they apparently share the same information sources, as they become more desk bound, they are keen to hear about things like the invisible web – however disappointing it actually turns out to be in practice. Computer Assisted Reporting (in the sense of downloading data off the Web and converting it into Excel files or building databases) is also attracting attention after years of promotion and the first such joint project is under way between journalists and R&I at *The Guardian.* What does not change is the way that progress comes about. Not sadly, as a blinding flash from on high: this is an information age let us turn to an information worker, but in the usual inch by inch advance, using persuasion and example and the individual approach.

There are many information professionals in 'Fleet Street' who believe that the role of librarian as researcher in the broadest sense of the word is dead or dying and that we should all undergo a metamorphosis into information architects and data managers It is indeed possible that cost considerations will prove them right. But until the day Nirvana is reached and we have librarians working alongside journalists – as valued guides round secondary information, as builders of intranets and selectors of their content, as CAR experts – all as a matter of course, I for one will not be dissuaded from my passionate belief that there is a research role to be played by librarians on newspapers.

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Libraries and open society; Popper, Soros and digital information

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This paper examines the role of libraries and information services, in promoting the 'open society' espoused by Karl Popper and George Soros. After a brief discussion of the nature of an 'open society', the paper covers the role played by provision of knowledge and information, of new technology, particularly the Internet, and of critical thinking and digital literacy in the development of this form of society. Conclusions are drawn for the role of libraries and librarians, with seven general principles suggested:

- provision of access to a wide variety of sources without 'negative' restriction or censorshi
- provision of 'positive' guidance on sources, based on open and objective criteria,
- a recognition that a 'free flow of information' though essential, is not sufficient;
- a recognition that provision of factual information, while valuable, is not enough;
- a need for a specific concern for the effect of new ICTs, and the Internet in particular;
- promotion of critical thinking and digital literacy;
- a need for explicit consideration of the ethical values of libraries.

Introduction

The purpose of this paper is to examine the role that may be played by libraries, and similar information providers, in promoting the kind of open society espoused by Karl Popper and George Soros. The nature of an 'open society' is first outlined briefly, before a discussion of the role played by provision of knowledge and information in the development of this form of society, the role of new information and communication technologies (ICTs), particularly the Internet, and the importance of critical thinking and information (or digital) literacy. Finally, conclusions are drawn for the role of libraries and librarians.

The term 'library' as used in this paper should be taken to include 'information services', 'knowledge centres', and all institutions of that kind. Similarly, the terms 'information' and 'knowledge' are generally used synonymously.

The nature of open society

Although the term 'open society' was first use by the French philosopher Henri Bergson, it modern conception stems largely from th work of Sir Karl Popper, particularly a expressed in his well-known *Open society an its enemies*, first published in 1945. He proposed, in essence, a form of social organisation based on the recognition that nobod has access to the ultimate truth; our understanding of the world is imperfect, and a perfect society is unattainable. An open societ is the best attainable solution – an imperfec society, which is capable of infinite improvement. In Popper's eyes, the enemies of ope society were totalitarian, closed regimes – specifically the communist and fascist dicta orships of the early and mid-twentieth century.

Popper did not, however, identify open society with any specific political or economic system, and open society is not to be automatically equated with current Western democracy [1, 2]. For an overview of the current status of the open society concept, see Jarvie and Pralong [3].

This concept was extended and somewhat amended by the financier and philanthropist George Soros. In particular, Soros noted that totalitarian closed societies are only one form of antithesis of the open society; an anarchic, uncontrolled capitalism, or the weak states resulting from the collapse of a closed society, is another.

> I now envisage open society occupying a precarious middle ground where it is threatened by dogmatic beliefs of all kinds, some that would impose a closed society, others leading to the disintegration of society. Open society represents near-equilibrium conditions, alternatives include not only the static disequilibrium of closed society but also a dynamic disequilibrium [4, p. 70].

Soros has put his ideas into practice through a network of Open Society Foundations, aimed at promoting the idea of open society in various countries, most particularly in the formerly socialist countries of Central and Eastern Europe and Central Asia.[1]

Considerations of knowledge and information play an important part in the thought of both Popper and Soros. Popper's political philosophy developed very much from these analyses of the philosophy of science, and specifically the growth of scientific knowledge; indeed Popper's concept of objective knowledge has been regarded as a foundation stone for information science [5]. Popper's emphasis is on the human ability to learn, and thereby to gain valid and useful knowledge, even though that knowledge is necessarily imperfect:

> thus we can *learn*, we can grow in *knowledge*, even if we can never *know* – that is, know for certain. Since we can learn, there is no reason for despair of reason· and since we can never know, there are no grounds for smugness or conceit over the growth of our knowledge [6, vol. 2, p 383] [Popper's italics]

For Soros, too, knowledge and information are important considerations for an open society He regards the current global capitalist system as a distorted form of open society. This system, and the traditional market doctrine, suggests that, with perfect information, markets will take care of themselves, returning to their 'natural' position of equilibrium:

> the main task [of ensuring that markets work properly] is to make the necessary information available and to avoid any interference with the market mechanism [4, pp. 175–176].

But Soros demonstrates that this is not a valid analysis of how markets truly work, the phenomenon of 'reflexivity', noted later, leads to a more sophisticated relationship between information and the operation of the market, and, by extension, society.

Open societies, Soros reminds us, consist of 'encumbered individuals', by contrast with the unencumbered individuals of the enlightenment philosophers:

> the thinking of encumbered individuals is formed by their social setting, their family and other ties, the culture in which they are reared. They do not occupy a timeless, perspectiveless position. They are not endowed with perfect knowledge [4, p. 92]

The role of information and knowledge in the open society is then somewhat paradoxical, perfect knowledge is denied to anyone, or any group or movement, but the provision of information, for learning and the growth of knowledge, is of great importance. Practically, this was recognised within the operation of Soros's Foundations by the establishment of several Programmes related to information and communication, notably the Library, Internet, Media and Publishing Programmes (now incorporated within a broader Information Progam)[2].

Information and knowledge in open societies

Given the importance of information and knowledge, and their communication, within open societies, it is reasonable to ask whether any particular kind of knowledge, or information resource, is associated with this form of society (which may be turned into the practical question, what should libraries, as an important form of information provider, be providing to promote open society). This will lead us, in this and following sections, to the identification of seven general principles underlying the role of libraries in open societies.

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[1] Details of the Foundations and their programmes may be found at http·;///www.soros.org

[2] Details of the programmes from http //www.soros.org

Popper's answer to the question of the 'best' sources of knowledge is unequivocal, and derives from the very basis of this thought:

> The principle that *everything is open to criticism* (from which this principle itself is not exempt) leads to a simple solution of the problem of the sources of knowledge... It is this: every 'source' – tradition, reason, imagination, observation, or what not – is admissible, and may be used, *but none has any authority*... every source is welcome, but no statement is immune from criticism, whatever its 'source' may be [6, vol. 2, p.378]. [Popper's italics]

Popper develops this theme further in his *Conjectures and Refutations*; while his arguments deal with 'sources' in the broadest sense, he makes it clear here that written sources have a particular significance:

> There are all kinds of sources of our knowledge, *but none has authority*... most of our assertions are based not on observations, but upon all kinds of other sources. 'I read it in *The Times*' or perhaps 'I read it in the *Encyclopaedia Britannica*' is a more likely and a more definite answer to the question 'How do you know?' than 'I have observed it' or 'I know it from an observation I made last year' [7]. [Popper's italics]

and similarly:

> There are no ultimate sources of knowledge. Every source, every suggestion, is welcome; but every source, every suggestion, is also open to critical examination. As long as we are not dealing with historical matters, we usually examine the asserted facts themselves, rather than investigate the sources of our information [8, p. 49].

Popper argues that we should not try to argue for the correctness of a view from its source, but rather criticise the assertion itself – using any and all other sources as necessary. Notturno [2, p. 136] interprets this as meaning that an appropriate authority should be the first word, not the last word, in a critical enquiry.

We may see from this that the basic tenet should be that any and all sources should be available within an open society framework (*principle I*); it is not, and cannot be, the function of the librarian, or any other information provider, to restrict access to sources, according to what is their judgement of what is 'best'. Their knowledge and understanding, like that of all other participants is imperfect, and restricting access to their chosen selection of sources, regardless of their expertise and high motivation, runs counter to the basic principles of open society.

This general idea needs to be qualified in two ways. First, it will be obvious that librarians, and other information providers, must in practice make choices as to what information products may be provided, if only on grounds of restrictions of budgets, space etc. However, such choices must be made openly and transparently, and in the clear knowledge that they are enforced choices, and not choices made according to the provider's ideas of what the users 'should' want or need. Second, this general principle does not prevent librarians from using their best judgement as to what will be most useful and acceptable to the users of information, and promoting and recommending this, as librarians have done from time immemorial; so long as this does not turn into restriction and censorship. Indeed, we should remember Soros's idea of open societies consisting of 'encumbered individuals', noted earlier, it will be essential for librarians to respect the encumbered individual, by providing information and knowledge relevant to their situation. Authoritative views may be useful as Notturno [2, p. 136] puts it, 'to discover how things stand in a field, what its major problems are, and which of the solutions that have been proposed seem most promising'. This will not violate the general principle of providing a variety of sources, and refraining from giving *de novo* authority to any of them, providing that it is done in a positive manner, by recommending certain sources from the many available, rather than in a negative manner of restriction and censorship (*principle 2*).

It may be objected that this is an unrealistic and naïve viewpoint, since it flies in the face of the obvious fact that in many subject areas – science, medicine and law being obvious examples – there are certain works that are regarded as particularly 'authoritative', and hence worthy of recommendation. However, describing such sources as authoritative is simply short-hand for their possession of a variety of desirable, and objective, characteristics: authorship by qualified persons, careful editing and checking factual data, regular updating, etc. Such criteria can be, and should be, used by librarians in justifying their recommendation of such works as useful, and users may judge for themselves whether they are sensible and valid This is entirely different from the simple uncritical statement that a particular work is authoritative.

A refusal to restrict access to sources amounts to support for a free flow of information, which Soros describes as 'perhaps the most potent force for democracy ..which makes it difficult for governments to misinform the people' [4, p. 111] This free flow of information is easily suppressed, if the government controls the media; or, according to circumstances, controls access to any other forms of the communication of information. But, simply allowing a free flow of information is inadequate, in itself, to uphold open society:

> 'In any case, the free flow of information will not necessarily impel people towards democracy, especially when people living in democracies do not believe in democracy as a universal principle' [4, p. 111].

The implication of this for libraries and other information providers is that allowing free access to all relevant sources of information is a necessary, but not sufficient, condition for them to be contributing to the development of open society (*principle 3*). A more proactive role is required This kind of a role has more commonly been assumed by libraries and information centres in the private sector, rather than by public libraries and information services, but there are indications that this is changing in many countries. A particularly interesting example is the Estonian situation, described by Virkus [9], where a 1998 parliamentary decree on principles of information policy specifies that 'information must be provided actively and systematically and, as a whole, be easy to comprehend'.

There is a further consideration, and that is George Soros's concept of 'reflexivity' Soros argues that statements whose truth value is indeterminate are, far from being meaningless as was claimed by the logical positivists, even more significant than statements whose truth value is known. The latter constitutes knowledge, helping us to understand the world as it is. The former, expressions of our inherently imperfect understanding, help to shape the world This is because of their reflexive character, and includes most generalisations of history, e g. Soros's example 'the common interest is best served by allowing people to pursue their own interests' [4, p 13] Reflexivity implies that participants make statements about the world, to form a picture which corresponds with reality, but their thoughts and statements also help to mould, change and create reality; statements may alter the subject matter to which they refer.

The implication here is that libraries should not just be 'information banks' providing chunks of knowledge, important though this function is for the operation of open society, and in particular should attempt to avoid giving any impression that they are providing the definitive answer to any question, other than relatively trivial factual matters They should also provide, and make it clear that they are providing, 'thought-provoking' material as an aid to the reflexive process (*principle 4*). This is a further argument, if one were needed, for the provision of a variety of perspectives and viewpoints, including those that are plainly contradictory, within a range of information sources

New ICTs and open societies

The increased significance of new information and communication technologies, and the Internet in particular, has created a new information landscape within which libraries must operate, and which has strong and pervasive implications for society, as well as for the specifics of information provision [*principle 5*].

Though Karl Popper's major works were written long before the advent of these particular ICTs, he nonetheless showed a remarkable understanding of the possible effects of changing information technology on society:

> We could conceive of a society in which men practically never meet face to face – in which all business is conducted by individuals in isolation who communicate by typed letters or by telegrams, and who go about in closed motor cars [6, vol. 1, p. 174].

Written in 1945, this encapsulates Popper's idea of an 'abstract society', one of the possible ends of an open society, as it leaves the 'tribal' closed society. There are strong negative aspects to this, but Popper also sees gains, for example the possibility of new personal relationships, independent of birth or location.

George Soros, writing with the knowledge of the effect of global communications and computer networks, sees the emergence of the 'transactional society', something very divorced from, and inimical to, an open society. In a 'transactional' society, individual transactions replace lasting relationships; each transaction stands on its own, and there is no sense of loyalty or worthwhile on-going interactions between the parties. The replacement of relationships by transactions in the business world, Soros believes, is an on-going historical process, which is well advanced; he notes the advent of the Internet as one contributing factor

A transactional society suffers from a lack of social values If everything, including professional life, is judged by money made, then open society, which relies on common social values, is not possible This is exemplified by work carried out by the Soros Foundation in the USA on the increased 'business ethic' in law, medicine and similar areas, in which 'market values have penetrated into areas of society that were previously governed by non-market considerations' [4, p. 73]. The pressures of the market place also affect journalism and publishing: 'ethical standards once thought intrinsic are not standing up very well to market pressures' [4, p. 236].

The transactional society is bound to affect the services of libraries and similar information providers, inasmuch as their activities and benefits are judged largely or wholly in monetary terms. Impersonal services, including the increasingly prevalent digital transactions, though efficient, may not always be appropriate Libraries may need increasingly to consider an explicit founding of their services on relationships rather than transactions, as much as possible. It also seems clear that the ethical standards of libraries and librarians may be as much under pressure as those of equivalent, perhaps higher profile, professions, and may need particular thought. Horvat [10] gives an example of how such considerations may need explicit consideration in library training programmes.

Among new ICTs, the Internet is the most prominent, and is usually thought of as a democratising medium, and hence as a generally positive force toward open society. Typical is the view of Paul Gilster [11, p. 42]:

> The power of the Internet come from the fact that [its] connections are decentralised. No one of these machines, no cluster of networks, can be said to run the enterprise. Democracy prevails. I can publish a message on the Internet as readily as you. I can choose which topics to read about and switch off those that don't interest me I can navigate the information space by making choices, running searches for keywords, and displaying content. Depending on my interests, I can become a content provider or remain a reader, meaning that what I get out of the Internet is very much a matter of personal preference. No one other than myself makes the choices about what I see.

But the Internet displays several negative features, which should be of concern to those wishing to see it as a positive force. Most obvious is its sheer volume of material, much of which is generally agreed to be of poor quality at best, often seemingly partial, biased and inaccurate. The occurrence of pornographic, racist and similar undesirable material is also well publicised. These factors may lead to calls for restriction of access, to 'protect' users from these undesirable features It need hardly be said that this goes against the general principles of free access enunciated above, and should be rejected if the Internet is to be a useful tool for promotion of open societies

The answers to these problems are likely to be multi-facted, but should take the form of positive encouragement and empowerment of users, rather than negative restriction and censorship. (Choldin [12] gives the cautionary example of Tsarist Russia, when censorship, initially introduced as a 'guardianship' function, aimed at providing a guide to good books, quickly attained a 'police' function.) One example of the positive approach is digital literacy, or information literacy, enabling users to apply critical rationality to the mass of material on the Internet, to select that which is of value to them; this is discussed later. Another example is the creation of 'quality gateways', guiding users to Internet sites of particular value, and indicating *why* they are of value, these are usually organised along subject lines [13], but could also be adopted for particular countries or communities.

Finally, another potential danger of the Internet is its homogenising effect, whereby all information sources are presented through a common interface, and with a common 'look and feel', thereby removing the familiar visual and tactile clues to quality and relevance present in printed material. Helping users – the 'encumbered individuals' of open societies – to overcome this, and deal confidently with Internet sources, is an important aspect of digital literacy.

Information literacy/digital literacy for open societies

'Information literacy' is a term dating back to the 1970s, and having a variety of meanings, though generally implying the ability to make effective use of information sources, including analysing and evaluating information, and organising and using it in an individual or group context [14, 15, 16]. The list of six components of information literacy according to the American Library Association is typical:

- recognising a need for information;
- identifying what information would address a particular problem;
- finding the needed information;
- evaluating the information found;
- organising the information,
- using the information effectively to address the specific problem.

The term 'digital literacy' has been used more recently to encompass the situation where networked resources are a significant part of those available [11, 14], and includes such skills as 'hypertextual navigation' and 'knowledge assembly'.

These ideas have received considerable publicity in the late 1990s, with one leading commentator arguing that 'companies, organisation, countries and societies that ignore the need to improve information literacy will not be in a position to compete effectively in the new information age' [17].

From what has been said above, it will be clear that the promotion of information, or digital, literacy will be a necessary function of any library service aspiring to promote open society. But the link is, in fact, more direct and basic, and stems from the idea of 'critical thinking' as an important part of information literacy [14, 18]. Maloy [19] explicitly links the need for librarians to promote critical thinking for evaluation of sources as a necessary complement to the provision of open access to all materials.

In the information literacy context, critical thinking usually implies.

- asking informed questions;
- posing problems in various ways before attempting to solve them;
- examining assumptions;
- solving ill-structured, 'messy' problems;
- evaluating sources of information,
- assessing the quality of one's own thinking and problem-solving;
- using mental frameworks to give context to a mass of information.

However, the idea of critical thinking, or rational criticism, has a considerably longer history, and is a fundamental part of the thinking of Popper and Soros on open societies. For them, it is the means of continually improving our always imperfect understanding, and thus a vital part of the establishment and improvement of open societies. Notturno [2, p. 51] suggests that 'the most important tradition in an open society is the tradition of critical thinking'. The original mission of the Soros Open Society Foundation in 1979 was threefold: to help open up closed societies; to render open societies more viable; and to foster a critical mode of thinking [4, p. 235] With the passing of events, particularly the aftermath of the collapse of the Soviet Union, the concentration is now on the second and third aspects [4, p. 235]

We can therefore see that the promotion of critical thinking, within the context of information, or digital, literacy is a fundamental role for any library aiming to promote open society (*principle 6*). Not only is it a necessary tool in helping users deal with the variety of sources, which we have argued must be provided without restriction if the aims of open society are to be upheld, but it also enables libraries to make a direct and active contribution to one of the fundamental requirements of an open society: that its citizens should be able to apply critical thinking to their own knowledge, and to information relevant to their own situations.

Libraries in open societies

From a consideration of the basic concepts of open society, we have, so far, established six general principles, which may guide libraries seeking to support the establishment and maintenance of open societies:

- provision of access to a wide variety of sources without 'negative' restriction or censorship;
- provision of 'positive' guidance, based on open and objective criteria, towards sources relevant to the situation and needs of 'encumbered individuals';
- a recognition that a 'free flow of information' though essential, is not sufficient,
- a similar recognition that provision of factual information, while valuable, is not enough;
- a need for a specific concern for the effect of new ICTs, and the Internet in particular;
- promotion of critical thinking, within a framework of information, or digital, literacy.

There has been surprisingly little explicit discussion of issues of this sort in the librarianship literature – Hannabuss [20] gives a recent review – although a belief in the library as a positive force for a healthy society has often been voiced as a 'given'. Examples range from a statement from the New Zealand Library Association [21]:

> [The library] can be the most valuable instrument of democracy and good citizenship. Where no library exists, books written by zealots and propagandists, and newspapers which tend to be sensational, can be potent weapons of subversion. But a good library service providing material in open well-balanced, many-sided collections ...can help to make democracy sane informed, stable and real.

to the views of Munson [22] on the British public library service:

> The total significance of the public library is fundamentally its influence on all the individuals who comprise a community and on the relationship of these people with one another... the importance of public libraries can be measured by the effect for good they have on society.

Statements of this sort have usually been made in the context of the public library service, Kerslake and Kinnell [23] review, and update, the idea that citizenship is predicated upon a right of access to information, and that the public library service has a particularly significant role in this respect While it is clear that public libraries, by their very nature, wil have a particularly important role to play in the promotion of open society, the contributions of other kinds of library service should not be ignored. National, academic and special libraries will all have a role to play, as may commercially funded services (see the remarks by Roberts below). An example of this is the variety of business information services and providers which have emerged as the countries of the former Soviet Bloc adapted to more open market conditions; Konn [24] describes this for the case of Russia.

Although librarians have, for the mos part, always held that their profession has a clear ethical stance and commitment, there has not always been clarity as to quite where this may fit within wider ethical contexts. As McGarry [25] puts it:

> it is relatively easy to talk in a general way about the ethical problems that arise in the day-to-day work of the information professional [but] it is a difficult task to analyse our moral views in a principled or systematic way.

One of the few examples that have been provided is Doyle's argument [26], based on JS Mill's philosophy, in favour of the free competiion of ideas as against library censorship, albeit well-intentioned. Thus we suggest the need for an explicit consideration of the ethics underlying library and information services as another important tenet for libraries in open societies (*principle 7*).

In one of the more well-structured discussions of this aspect, Alex Byrne [27] sees the esponsibilities of the librarian as discharged 'within a frame of understandings, an ethic of service and a context of society' A shared conext, Byrne suggests, is provided by the Universal Declaration of Human Rights of 1948, and specifically its 19th Article, which ncludes the right 'to seek, receive and impart nformation and ideas through any media and regardless of frontiers'. This means, for Byrne, hat libraries 'must be able to provide all people with access to the information they want, because access to and transmission of nformation are essential cornerstones of human rights'.

Choldin [28] presents a somewhat similar view of the assumptions underlying access to nformation and freedom of expression. all ibrarians and other information professionals are committed to these general principles, but people in each country know their own situaion better than anyone else, and are therefore in the best position to suggest strategies and solutions for improving their own situation

Ideas very similar to these, though expressed in somewhat different terms, have been put forward by Roberts [29], as a description of a concept which he terms 'world librarianship'. This focuses strongly on the role of the librarian as the guarantor of wide and open access to information:

> If there is one very significant task for world librarianship, it is to develop, open up and sustain a tradition of public knowledge and public access as a fundamental right.... World librarianship should be the tradition that regards all information and communication activities as a public good, with a private value at many levels...Where information and communication resources are predominantly private, restricted and elitist, there is every reason to believe and suspect that deprivation and worse for the majority will be a result [29].

A second theme is that of access to information in all formats.

> I cannot give a certain or total definition, but I have a feeling that librarianship and its philosophies are not so much about libraries and books (important though these are), but by the overall commitment to public information in the public domain [29].

In addressing the specific ethical aspects of world librarianship, Roberts seeks to avoid equivalencing public access with publicly owned provision:

> Giving service is a public act, and one should not confuse private ownership with public ownership as the test, nor market economics with public economics. A private commercial library or information service can just as well serve the public interest and the public domain as one paid for wholly by public funds. The key difference is the professional philosophy (or even the moral philosophy) of those who do the providing [29].

Of course, this is not to say that the opposite argument – that a free market philosophy is the only one that will support valid information provision – is valid Kuzmin [30], for example, points out that, for all its faults, the Soviet regime did a great deal to promote knowledge to the population (though within strict limits), with libraries as an important instrument. Similarly, Moore [31], in an analysis of the policy models which underlie planning for 'information societies', compares the neo-liberal (market-led) and dirigiste (interventionist) systems. He concludes that the latter, emphasising a holistic approach, while still being compatible with an economic system based on capitalism, is the more appropriate means of introducing an information-based society This echoes Soros's concerns about the transactional society noted above, and, more generally, his concerns about reliance on global markets to solve all problems [4]. Another clear example of this concern in the library context is provided by Ladizesky and Hogg [32] in their discussion of the changes in the traditional pattern of international exchange of publications between libraries in the former Soviet Bloc and in the West, exchanges rely upon a 'cultural relationship', whereas current trends towards regarding all such interactions as basically commercial transactions are weakening the ability of libraries to take part in such programmes.

Charles Leadbeater [33], goes beyond the public/private dichotomy, in identifying a distinction between 'knowledge radicals' and 'knowledge conservatives' – part of the new divisions in society being wrought by innovation and new technology (see also Leadbeater [34] for a broader vision of a 'cosmopolitan and liberal' knowledge society):

> Knowledge radicals stand for open societies, prepared to engage in the diversity, immigration and experimentation that goes with radical knowledge creation Politicians who embrace innovation and change will stand squarely in the Enlightenment tradition which puts reason and ideas, rather than nation and belonging, at the heart of politics. Knowledge radicals will stress the opportunities inherent in the new economy and they will appeal to the highly mobile and independent knowledge workers who will make up the labour aristocracy of the new economy
>
> Knowledge conservatives take a more cautious, risk-laden view of progress They tend to value tried and tested old knowledge, prefer a slower rate of innovation and defend established institutions. The knowledge conservatives will come in different stripes: communitarians, new environmental romantics, authoritarian populists, traditional conservatives and defenders of established vested interests All will argue that knowledge should be controlled, restrained or suppressed for the sake of tradition and community

This latter viewpoint has a long, and ignoble history, from the argument of Mr John Imray of Aberdeen against proposals for the setting up of a public library service in Great Britain, that it was 'raising the lower classes too highly by giving them information and that it is better to keep them without it' [35], to the more sophisticated Soviet information strategy of 'the greatest possible sum of knowledge – but within certain limits' [30].

In general, it seems that those who believe in an open society must be generally on the side of knowledge radicals. This does not mean that librarians who take this view must discard all older knowledge; on the contrary, a significant role may be to argue for the continuing relevance of well-established sources and techniques, against those who argue that only new technologies can provide worthwhile provision. Nor does it mean that libraries should not be concerned with preservation of nationa and regional heritage and culture; on the contrary, this should be one of the main functions But, a repudiation of the idea of the suppression of knowledge 'for the public good' must lie at the heart of any belief in libraries as agents of open society.

Alex Byrne [27] makes this point strongly. It may be argued that an assumption of the absolute right of the individual to access whatever information they wish is very much a Western viewpoint, and that, particularly in the Internet age, complete openness to what information is most prevalent may result in the *de facto* imposition of an American culture. Noting these concerns, Byrne makes the case that librarians must take care to 'protect the interests of minorities, so that they do not lose their identities in a global media village'. This may involve active promotion of appropriate materials, and sensitivity to the reaction of library users to certain kinds of information This echoes Choldin's [28] view that librarians of each country are in the best position to know how to bring about access and openness in their own situation However, Byrne argues strongly against any attempt at censorship, or undue restriction of access, even of potentially highly offensive materials, such as those advocating racial hatred. Any such attempt is likely to be futile, in the age of international networks, and is likely to have, or lead to, undesirable consequences, unintended at the outset Byrne gives a number of library examples of this, as does Oppenheim [36], who suggests that the Internet environment is such that America is, in effect, exporting the First Amendment to the rest of the world. Oppenheim's recommendations are similar to Byrne's: individuals should be empowered to make their own choices about the material which they access.

One concrete example of this is the use of filtering' software to deny access to 'inappropriate' Internet sites; the controversy as to whether libraries should make use of this technology is reviewed by Smith [37] One particularly sensible approach, in line with the arguments of Byrne and Oppenheim, appears to be that of the New Jersey public library service [37, pp. 189-190; 38]. Its general principle is that all users should be allowed unrestricted access to Internet materials, and hence it opposes the imposition of filtering software. However, it supports the idea that libraries should provide such software, for those users who actively choose to use it, provided that they are provided with advice about the limitations of such software, and about possible unforeseen consequences of its use

Such concerns are not, of course, limited to the new technologies; librarians, in very different societies, have often had to argue against censorship of 'improper' or 'inappropriate' printed materials. Jones [39] gives a detailed discussion of the issues of intellectual freedom, access and censorship in libraries, albeit from an almost exclusively American perspective. Muswazi [40], for example, describes the current difficulties facing librarians in the countries of Southern Africa. Lee [41], in opposing the American campaign for 'Family Friendly Libraries', is one of the few to ground such opposition in an explicit argument for libraries as promoters of an open society. The Internet, however, undoubtedly exacerbates the problem; though it is interesting to note that the same concerns were expressed about an earlier revolutionary device for the communication of information – the printing press [42].

In general, the Internet, and digital networked information generally, serve to point up and bring into a sharp focus several of the points discussed above. The need for open and objective criticism of the value of information resources is made apparent by the proliferation of resources, many of questionable value, which are now readily available, and is met by the sets of detailed 'quality criteria', reached by consensus and widely publicised, used by subject gateways [13, 43]. This same factor makes the need for critical thinking, now cast in the form of digital literacy, of immediate importance [11, 14].

The Internet is being seen in many quarters as a tool for providing better access to information of immediate relevance to open society; an example from Great Britain is the 'citizenship in a modern state' area of funding within the 'New Opportunities Fund', which funds Internet access to 'information that helps people to access services, including information rights and obligations and how to be effective in dealing with different organisations' (details are available from http://www.nof-digitise.org). The increasing significance of digitised information, and the skills of digital literacy needed to deal effectively with it, are of vital importance for librarians involved in the promotion of open societies. One response to this has been the extension of a two-week course on 'Libraries and the Internet', at the Soros' endowed Central European University to deal with the wider concept of 'Digital Literacy for Open Societies' [44].

Finally, of course, it is necessary to retain a sense of proportion. While the library profession may consider that its contribution to open society to be self-evident, others may not agree. Roberts [29] speaks of

> . . . the contribution of world librarianship to individual and social wellbeing, with a status not less than education, economy, livelihood and health. The contribution to political life and cultural life that information can make is self evident, and there must therefore be full public means of provision

But this is an over optimistic assessment. For one thing, there are other needs and rights which may seem of more immediate importance than access to information: as Yilmaz [45] puts it

> the phrase 'right to information' for a person who is hungry, who does not have enough money to live, who is not educated, and who does not have freedom, does not have any meaning.

The commendable proposition that access to information may be a powerful aid in overcoming all these difficulties is not an obvious one.

Furthermore, while we may wish to agree with Roberts that the importance of 'information' may be accepted as self-evident – do we not, after all, live in an 'information society' during an 'information age' and embracing an 'information economy' – the same is certainly not true of libraries. The emphasis in many quarters on provision of Internet access as a complete solution to the problem of information access is the most obvious example. Libraries are effective promoters of open society, but if that role is not recognised, then both libraries and society will be losers.

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Information and social quality

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This paper introduces the concept of 'social quality' as a measure of quality-of-life and it sets out a framework for identifying social indicators of the relationship between information and social quality. Social quality has four elements: socio-economic security, social inclusion, social cohesion and empowerment. Illustrative indicators are identified at both national (Demos) and community (Ethnos) level for four different aspects of each social quality element: input, process, outcome and impact. Then the distribution of information and social quality between Demos and Ethnos levels is investigated. It is concluded that usable indicators of all aspects of each element of social quality can be identified and that analysis of informational social quality at Demos and Ethnos level can add to knowledge about information provision and policy, particularly with reference to minority and marginal communities.

Introduction

The idea of 'social quality' was launched in June 1997 at a public ceremony in Amsterdam timed to coincide with a meeting of European Union Heads of State [1]. Unlike many other quality-of-life constructs it focuses on the social as well as the individual level by incorporating both collective and individual attributes: thus a society with a high level of social quality is not only economically successful, but also promotes social participation and social justice.

The overriding aim for social quality is to measure the extent to which society is fair and inclusive. This can be done by evaluating the extent to which all people in society are able to participate in the social, cultural, economic and political developments of their communities and live under conditions that enhance their well-being or quality of life.

The European Union actively embraced the concept and has now incorporated it into its social reporting. The primary European Union annual social statistical report, *The Social Situation of the European Union 2001*, is themed around social quality. In addition, the European Commission's Directorate General for Employment and Social Affairs chose social quality as one of its three priority areas for action in 2000.

There is now a substantial literature on social quality, both national and international, with particular emphasis on Europe [2, 3], and 1999 saw the launch of *The European Journal of Social Quality* [4]. Considerable strides have been made in its theoretical and conceptual development [5, 6] and in its relationship to policy [7, 8]. However, no matter how theoretically sophisticated or policy-relevant a concept is, the most important task is to ensure that it can be used effectively in practice [9] Considerable steps have already been taken towards constructing social indicators for measuring social quality, particularly in relation to material and psychological well-being, education, employment, health and housing [10, 11]. In this paper we argue that access to and control over information is central to social quality and we then make a start in identifying relevant social indicators for all the elements of social quality.

nformation in community life

The UK Government Social Exclusion Unit dentified access to information as a key problem faced by people living in deprived communities [12] and established a Policy Action Team on Information Technology with a remit o identify models for improving access to communications networks as a means of strengthening community ties. It reported in March 2000 [13] and its recommendations include he provision of community based information and communication facilities in every deprived neighbourhood by April 2002 and that local provision should reflect the community's cultural background. The Team set out very ambitious longer-term targets

> our aspiration is that by 2004, 75% of people living in deprived neighbourhoods will have the capabilities to access electronically delivered public services and the skills to do so, if they wish and 100% by 2008 [*Key Recommendation 6*] [13].

Three central themes emerge from the Policy Action Team report. The first is the importance of information access both within the community and between the community and the wider society. This supports the work of Harris [14] on the role of information in sustainable communities and Tsoukas [15] on the role of citizens in an 'information society'

The second theme concerns the dangers of social exclusion arising from inequitable access to information. This, of course, is central to the remit of the Social Exclusion Unit and, as will be seen below, social inclusion/exclusion is one of the main elements of social quality. The link between social exclusion and the information society has been explored by the UK National Working Party on Social Inclusion (INSINC) [16] and in the USA in Kaku's work on 'the information ghetto' [17]

The third theme concerns the role of information in community empowerment, which again is an element of social quality. The Policy Action Team highlighted the danger of deprived communities becoming further disempowered by lack of access to information. Sohng [18] claims that new social power relations emerge from the growth of new social elites in a 'knowledge society'. These can have an impact on the relationship between the nation-state and the community and on the extent to which the community can express its cultural traditions and identity [19].

The use of information technology has a tendency to amplify the extent of empowerment or disempowerment within a community, in that information technology networking operates most effectively in groups that already interact effectively through conventional means [20]. Thus a community which already has an information communication tradition can more readily become part of the information society than a community with no such tradition.

Social quality

The concept of social quality was developed among European policy makers because it provides a wider and multidimensional approach to the quality of life than does poverty or social exclusion. Social quality is intended to be comprehensive and to encompass both objective and subjective indicators in society. It has been defined as 'the extent to which citizens are able to participate in the social and economic life of their communities under conditions which enhance their well-being and individual potential' [21, p. 3]. Four components of social quality have been identified, each of which is conceptualised as a continuum: social-economic security/insecurity; social inclusion/exclusion; social cohesion/anomie, and empowerment/disempowerment

Social-economic security/insecurity refers to the way the essential needs of citizens with respect to their daily existence are addressed by the different systems and structures responsible for welfare provisions. An acceptable minimum of social-economic security provides protection against poverty, unemployment, ill health and other forms of material deprivation.

Social inclusion/exclusion is connected with the principles of equality and equity and the structural causes of their existence The goal is a basic level of inclusion with help of supportive infrastructures, labour conditions and collective goods in such a way that those mechanisms causing exclusion will be prevented or minimised. This element focuses attention on the structural causes of exclusion[1].

Social cohesion/anomie concerns the processes that create, defend or demolish social networks and the social infrastructures underpinning these networks. An adequate level of social cohesion is one that enables citizens 'to exist as real human subjects, as social beings' [22, p. 284]. On the other hand anomie is fostered by regional disparities, the suppression of minorities, unequal access to public goods and services and an unequal sharing of economic burdens.

Empowerment/disempowerment is about the realisation of human competencies and capabilities, in order to fully participate in social, economic, political and cultural processes. It primarily concerns enabling people, as citizens, to develop their full potential.

Individually these elements can have negative as well as positive connotations: for example a socially cohesive society can be highly controlling, which can lead to disempowerment of some sections of society. But taken together they are intended to provide a comprehensive model of the social and economic determinants of citizen well-being. Social quality is thus a holistic concept encompassing both processes and outcomes, which can be operationalised through the creation of indicators for each of its elements.

Demos and Ethnos

Social quality is centrally concerned with people participating in the social and economic life of their communities. Here we follow Delanty [23] in distinguishing between two types of community: 'Demos' and 'Ethnos' 'Demos' is on a macro-level, including the nation-state or society, membership of which has been traditionally construed as universal and inclusive for its citizens [24] However, this conception no longer fits in well with nations which have been transformed into multiethnic societies and where different groups have differing statuses and identities and where the notion of Demos loses its clarity [25, 26, 27, 28].

In this context Melluci [29] notes that complex societies are unable to provide forms of national membership and identification that meet individuals' needs for self-realisation, communication and recognition. The relationship of a person with a 'community' as well as with a nation becomes a focus of analysis. In this context, Ethnos offers an alternative form of identification in today's multicultural society where citizens live side by side with resident aliens.

Ethnos, or cultural community, is less easy to situate than Demos [30]. At its strongest and most conceptually clear, it can be seen almost as a state-within-a-state, as with the Flemish and French speaking communities in Belgium [31], but perhaps it manifests itself most clearly in minority groups all originating in one country but living in another. Delanty identifies three characteristics of Ethnos: trust; solidarity – a feeling of togetherness, collectivity and mutual attachments; and autonomy – the recognition of the value of the person as a social being [32].

Information indicators for social quality

A start has already been made in constructing social quality indicators [10, 11]. This has included identifying domains for each social quality element, and then creating a series of indicators for each domain at both Ethnos and Demos level. The identification of domains has largely mirrored the substantive areas of the social policy [33] and quality-of-life [9] literature which, with limited exceptions [34], have traditionally not encompassed information resources. The purpose of this section of the paper is to identify social indicators relating to information for each of the social quality elements at both Demos and Ethnos levels.

For each element, indicators will be identified for each of four dimensions: input, process, outcome, and impact [35]. Input relates to the information resources of the nation-state or community, which can include, for example, the information infrastructure. Process indicators can address the following questions: first, what is the range and accessibility of information and how many in the community are not eligible to use those resources; and second, how many cannot or do not use the information resources? Those who cannot use information sources can include those who are deprived of access because of lack of citizenship rights. Non-use can include citizens or members of a community who are ignorant of their rights to, or knowledge of, the use or availability of information resources [36]. Outcome indicators can address the question: how many of those who use information get what they want from it. and/or achieve satisfaction in its use? For example, how many who accessed a community bulletin board found the information they needed and, if the information was there, was it accurate and updated and were they satisfied with it? Impact indicators relate to the change in the nation or community as a result of the outcome of the information-use. This could include the impoverishment and fragmentation of spatial communities by decreased use of face-to-face information exchanges [37]. Alternatively it could include subjective feeling of participation in the 'information society' and feeling of empowerment as a result of the accessibility and use of information [38].

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[1] Social inclusion and social exclusion here relate both to a continuum of the processes of inclusion and exclusion and as a dichotomy of social conditions of being includes and being excluded.

Social quality information indicators: Demos

Figure 1 *Information indicators for the nation-state (Demos)*

Elements of social quality	Input	Process	Outcomes	Impact
Socio-economic security	National information Infrastructure.	Information needs covered. Number and type of information sources	Proportion of population accessing information services relevant to material standard of living.	Information utilisation by citizens in relation to GDP. Prevalence of usage of information sources as a taken-for-granted part of daily social life.
Social inclusion	Accessible information	Proportion of the population with information skills Awareness of information.	Proportion of population using information skills and finding information useful	Utilisation of information in enhancing inclusion Use of Information by demographic variables
Social cohesion	Informational foundations of civil society constitutional guarantees of freedom of information Material conditions enabling equitable access to information to all groups in society	Legislation and regulations to ensure equity in information use Provision for information use in the public domain Distribution of information skills and awareness of information availability among different groups in society	Equitable distribution of use of information among different groups in society	Subjective perceptions of participation in the information society Strengthening of informational networks and institutions that enhance societal solidarity
Empowerment	Information resources available networks, public access points, websites etc	Accessibility of information resources, participation in information networking	Achievement of informational competencies and capabilities, utilisation of information in daily life	Self-reported subjective and holistic evaluations of personal empowerment and quality of life achieved through use of information resources

Socio-economic security

Socio-economic security at Demos level is about different systems and structures responsible for meeting citizens' essential needs. Thus the fundamental requirement for an input information indicator is an effective infrastructure of information provision – both hardware and software – that can be utilised on a citizenship-wide basis. Process indicators will relate to the range of information provided and should include full welfare benefits information, details of political and legal rights and of health and personal social services for all major health conditions and disabilities [39]. They also cover education and employment (including the provision of information systems that enhance people's employment security and rewards). Outcome indicators measure the overall utilisation of these provisions, and impact indicators relate to their effect on society – to the extent to which an 'information society' has been created [40].

Social inclusion

Social inclusion information indicators tap into the same areas as those of socio-economic security because social inclusion depends upon, among other things, a minimum level of the collective goods that confer socio-economic security. Here, though, the focus is upon *who is included* rather than on macro systems and outcomes. Therefore, whereas the input indicators relate to the accessibility of the information provided, the process indicators tap into the skills and awareness of citizens; how many are confident in their ability to use information systems such as the Internet and how aware are they of what is available? [41] The social inclusion outcomes are the proportions of the population using the information systems, and their impacts relate to enhancement of their social inclusion – both subjectively and objectively – though utilising the information systems [42]. The UK Department of Health and Social Security (DHSS) set up an experiment where user-friendly welfare benefits computers were installed in public places (including a hypermarket and a neighbourhood centre). They were used – without any personal assistance – by a large number of people of all ages and from a wide range of social backgrounds. This was an example of inclusion where people could get information on social security, housing benefits etc. that ameliorated their multiple deprivation and marginalisation [43]

Social cohesion

Social cohesion refers to networks and institutions that combat inequalities and enhance social solidarity and shared identity. It is closely related to the concept from economic sociology of social capital, and the informational aspects of social cohesion are similarly related to information capital [44, 45]. In terms of combating inequalities, information indicators of social cohesion are to do with the distribution of information inputs, processes, outcomes and impacts across all groups in society [46]. Therefore the goal is for equality of access through to impact across income groups, employment categories, economic activity groups, age and gender groups, ethnic and language groups, and across the range of health and disability statuses [47]. A good test of informational social cohesion is in its impact upon the most informationally disadvantaged groups in society, for example people with learning disabilities and recent migrants who have not learnt to speak the language of their new country. In terms of enhancing social solidarity and shared identity, information indicators of social cohesion have to do with protecting, extending, utilising and strengthening societal institutions, guaranteeing freedom of information, and the sets of citizenship informational rights that taken together comprise 'information society' [48, 49].

Empowerment

The informational aspect of empowerment concerns the extent to which information contributes to enabling people, as citizens, to develop their full potential [50]. It has two aspects; the first is the extent to which empowerment is facilitated and enabled and the second is the extent to which it is achieved. The former is related to input and process and the latter to outcome and impact. The input and process of informational empowerment is in effect the result of the input and process of informational social inclusion and cohesion (and, to a lesser extent, socio-economic security). Informational empowerment can take place when two conditions are met: first, the facilities and resources are available; and second, where individuals are both empowered by societal factors and empower themselves by utilising information resources in enhancing their quality of life [51, 52]. This achievement of empowerment is to do with outcome and impact. An empowered outcome is the use of informational competencies and capabilities in daily life. Its impact is measured either subjectively or objectively by its effect on the individual's quality of life

Social quality information indicators: Ethnos

Figure 2 *Information indicators for the community (Ethnos)*

Elements of social quality	**Input**	**Process**	**Outcome**	**Impact**
Socio-economic security	Community information Infrastructure	Range, accessibility and relevance of community information resources	Range and amount of information amenities and services used within the community	Community information used as information capital.
Social inclusion	Community information networks Information sharing Accessible community information.	Proportion of different social and demographic groups in the community with information skills	Proportion of community accessing and using community information networks.	Use of community information within the community by different social and demographic groups
Social cohesion	Informational foundations for a unique and strong community identity	Availability of community information infrastructures and networks. Distribution of information skills and awareness of information availability among community members in society.	Participation, collaboration and information sharing Community communication in relation to information on community history, traditions and identity Extent of community information capital.	Effect of changes in community information capital on community social cohesion Enhanced community solidarity and sense of identity
Empowerment	Information creation, transmission and control focused on community issues	Direct access to community information resources. Community participation in information creation and networking	Extent to which information plays a central role in community identity.	Self-reported and holistic community evaluations of the role of information in the fulfilment of community identity and independence

The relationship between community and societal *socio-economic security* operates at two levels: (i) the community as a part of society and (ii) within the community itself. The first is relatively straightforward. societal socio-economic levels are the yardstick for measuring the community's success or otherwise, and this is as true of information as it is of other areas. The second aspect is more fruitful in that a community with a strong Ethnos identity will have its own community information resources and it is this aspect that is included in Figure 2. The ultra-orthodox population in Israel is an example where the community is the main provider of information. Ultra-orthodox Jews live in homogenous neighbourhoods where often Yiddish and not Hebrew is the spoken language. It is forbidden to sell national newspapers in these areas: the only newspapers available are those from the ultra-orthodox community itself. Ultra-orthodox Jews do not have television sets and if they own a radio they will listen only to community radio stations. Community information is transferred mainly through community newspapers, notices placed on community billboards and by loudspeakers from cars cruising through the neighbourhood. Another important means of information exchange is through face-to-face contact by men attending synagogue for prayer three times a day. In addition Rabbis are instrumental in information exchange through speeches and teaching in synagogue and school settings [53].

There are two levels of community *social inclusion*. The first relates to the community itself and the extent to which it is included in the society. This is related to community empowerment, discussed below. It also links to the notion of 'community citizenship' [54]. The second level, dealt with in Figure 2, relates to individuals' inclusion within their communities. This has become a major issue in many migrant communities and here information plays a key role. Anthropological research has indicated that women from rural South Asian Muslim communities have less access to kinship and neighbourhood information networks after migrating to the UK, reducing their levels of community participation and involvement [55, 56]. Moreover, such women, many of whom do not speak English, are to a large extent socially excluded in informational terms from the wider Demos society too.

Information indicators of community *social cohesion* relate specifically to community information infrastructures and networks. Community social cohesion is highly dependent upon community social capital and thus community information capital. The importance of network-mediated information was demonstrated in Putnam's classic study of differential social capital in communities in Northern and Southern Italy where the stronger associational networks in the former led to greater civic solidarity [57]. Information is also central to community 'identity' in that communities as Ethnos are social groups constructed out of common historical and cultural experience [30]. Knowledge of traditions and heritage are central to ethnic identity, particularly when communities are geographically dispersed.

Community *empowerment* is linked to community social inclusion and community cohesion as follows. Social inclusion provides the principles of equality of opportunity, which gives communities the realistic choice to seek empowerment if they so wish. Social cohesion in its creation of networks and infrastructures enables empowerment to take place. Thus social inclusion is more of a prerequisite or 'input' of empowerment, whereas social cohesion is a 'process' of empowerment; a community cannot empower itself without social cohesion. At the same time social cohesion in a community does not necessarily come to its full expression if it is not empowered. The outcome of community empowerment is to do with having a clear sense of its identity while its impact is the strength of the community's identity in relation to both other communities and the society as a whole [54]. Within this context the information indicators of community inclusion and cohesion are central to the input and process of community empowerment. The outcome of the role of information in community empowerment is the part it plays in creating and maintaining a sense of community identity and its impact lies in the extent to which this identity leads to community self determination [58].

Conclusions

This paper is concerned with issues of the distribution of quality of life, via the interrelationship between information and social quality. It is argued here that information plays an ever-increasingly important role in the fulfilment of each of these elements and should be included in any set of indicators of social quality. Figures 1 and 2 present a first attempt at identifying illustrative information indicators relating to each aspect of each element of social quality. This has been done for two purposes. The first is to attempt to demonstrate the relevance and salience of information to social quality; and the second is as a prelude to a more rigorous and systematic operationalisation of the informational domain of each social quality element.

These illustrative indicators have been identified at both national (Demos) and community (Ethnos) level. The interaction between these two levels is particularly pertinent to members of cultural minority groups within multicultural societies. An area of major concern is where there is low informational social quality at both levels, leading to minimal social quality in an information ghetto.

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The future of the British broadsheet newspaper on the World Wide Web

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Traditional media, such as newspapers, are having to reassess their role in the Internet age. Not only are newspapers having to compete with each other, but also with foreign newspapers from all over the globe and other information providers choosing to deliver news on their websites. The aim of this paper is to determine the present state and the future of the British newspaper on the World Wide Web.

An evaluation of the five British broadsheet websites was carried out between 11th August and 11th September 2000. Three broad categories were selected to evaluate the websites: information content, interactivity and business and marketing features. Interviews were also carried out in order to gauge the opinion of journalists, information specialists and New Media professionals as to the future path for newspapers.

The results showed that newspapers, to a certain extent, are still repurposing their hard copy content for the Web. However, online newspapers are making some advances by maximising their content and by developing discussion forums and feedback mechanisms. FT.com has made the greatest effort to reassess its purpose on the Internet. The interview results showed that there is no clear strategy for the future of newspapers on the WWW. However, what became clear was the opinion that newspapers should concentrate on targeting a local audience, facilitating community publishing and investing in research. All stress that whatever move they make, newspapers must make one and fast.

Introduction

The Internet is rapidly evolving into a universal conduit that is overturning the media status quo. Traditional media such as newspapers and magazines are having to reassess their role for the Internet. Newspapers are no longer just competing with each other, they are in an entirely new arena, where the old boundaries of publishing have changed beyond all recognition. Newspapers not only have to compete with other papers in their locality or country, but with newspapers from all over the globe. The newspaper industry is bewildered by the speed and scale of the changes that it faces.

Matters are further complicated by the huge success of Internet Providers such as Yahoo and MSN, who are the most trafficked consumer websites. The announcement on 10th January 2000 of AOL's $183 billion deal to purchase Time Warner sent shockwaves throughout the business world. The deal marries AOL, one of the world's strongest online brands, with Time Warner's high quality content and will be a hard company to compete with [1]. In the light of these developments newspapers will have to reshape their core business, to take advantage of new distribution opportunities. Indeed, newspaper proprietors who fail to recognise the power of the Internet face a very uncertain future.

Aims and objectives

The aim of the research was to determine the present state and future of the British newspaper on the World Wide Web. Exploring, in particular, three key objectives:

- Are newspaper websites currently doing more than just shouting 'hello, we have a web presence'?
- What do those in the newspaper, information and New Media industry see as the best strategy for the future development of newspapers on the Web?

- What options are available for their future development?

Background

All of the national broadsheet newspapers in the United Kingdom now have a presence on the World Wide Web. *The Daily Telegraph* launched its Electronic Telegraph service in November 1994, the *Financial Times* unveiled FT.com in 1996 and *The Guardian* followed in January 1999 with the Guardian Unlimited website [2] Websites such as the Electronic Telegraph and Guardian Unlimited rank as some of the most well-known in Britain and have received widespread acclaim.

The problems facing newspapers

Offline problems

The twenty-first century, undoubtedly, poses a challenge for the newspaper industry. Steve Case, Chief Executive Officer at AOL, stated that 'the newspaper business was somewhere between beleaguered and dying' [3] However, the industry has long been facing several challenges to its role. Newspaper circulation has been in decline for several years. According to *The Economist* 'it has been falling for 35 years in Britain' [3] Newspaper editors are particularly concerned about the demographics of newspaper reading. The young are reading much less than those in middle age. This has serious implications, as newspaper reading is thought to be a habit acquired at an early age.

The increase in other mediums such as television, computer games and the Internet has meant that the newspaper is competing in a completely new arena In the bricks and mortar world newspapers put together packages which attract the readers. However. newspaper websites are fairly low down on the list of online places that people go for news. Specialists like ESPN, a sports portal, and ivillage, a portal for women, have been picking off parts of traditional newspaper coverage and making it into a business.

One of the most frequently expressed concerns about the commercial viability of newspapers is that they will lose some or all of their classified advertising revenue. The key revenue for most print newspapers is advertising and where newspapers once had a monopoly as the leading source for classified advertisements, they are now competing against a wide variety of websites. The competition in this area is becoming 'white hot as new sites offer cheaper rates and full search functionality' [4].

Online problems

In addition to the offline problems faced by British broadsheet newspapers, the Internet also poses a great threat. The notion that technology raises issues for the future of British newspapers is not new to the industry. Every new medium has been hailed as the death of newspapers. The Internet, however, threatens to become more than a distribution channel for news, it is threatening to transform business, commerce and information

Accusations have been levelled against British broadsheet websites that they rarely offer more than newspaper based content. According to Michael Bromley and Tom O'Malley:

> The deep interest shown by many traditional media owners in the 'information superhighway' suggests that they expected there to be business as usual [5].

Newspapers boast of their editorial content and community traditions, but few are expanding their content offerings or using the tools of the Internet to cultivate communities of online interest [4].

News alone is not going to propel the newspaper community into the star ranks of Internet companies in terms of readership or revenue. Internet observers are agreed that simply posting the printed version of the newspaper on the website is a mistake. Online users are promiscuous. If one story is missed or there is a slow download, users can quickly drop a once favoured website. The Internet has infused an attitude that everything should be available 'here and now'.

Newspapers and the future

Despite the uncertainty and predictions of the death of newspapers, there is considerable opinion that newspapers are in a prime position to succeed online if they recognise the Internet's potential and follow various strategies. In this era of overwhelming cascades of information and entertainment from a proliferation of websites, newspapers have a wealth of experience in aggregating information. Three strategies are possible:

1. Portal strategy

The most notable suggestion is that newspapers should become portals. This suggestion is not a new one. In 1998, Steve Outing, a specialist on newspapers on the Internet, stated that 'newspapers have great potential to become portals' [6]. Portals are 'an opening, doorway, gateway, outlet, entry or foyer to other places. Web portals offer information, e-mail and access to other sites.' [7] Portals such as Yahoo and AOL offer its users a package of news, information, Internet tools, services and channels containing content and e-commerce. Rather than provide access to everything, portals take responsibility for the choice of content.

British newspaper websites could offer the user a targeted environment in which people can explore and use the many features of the Internet in an environment that is relevant to them. Newspapers could add value to their websites by guiding the user to reliable sites. Newspapers are the best placed companies in Britain to do this as they have a reputation for independence and probity There is still a notion that newspapers provide diversity, scepticism and freedom and hold on to values that are appreciated by a large majority of the population.

2. Community publishing strategy

Newspapers can also reassess their traditional role and extend it by offering services such as community publishing. The concept of community publishing refers to employing tools that permit community groups and individuals to self-publish on the Web, under the aegis of the publisher's brand names. [8] This strategy requires the newspaper to establish an infrastructure to facilitate the communication between members of the community and distribute relevant news and information. This will increase traffic on the website as well as online transactions.

3. Content-related strategy

The basis of the content-related strategy is that newspapers should leverage their most valuable asset by selling it to websites that are strong in utility and services but not in editorial content. Internet Service Providers need to acquire proprietary content and make partnerships with media specialists. Newspapers could allow other websites to link to the newspaper's filtered content, thus increasing traffic. E-commerce websites often use newspaper reports to help sell their products as content is a good driver for transactions.

Methodology

An evaluation of newspaper websites and semi-structured interviews were felt to be the most appropriate method for addressing the study.

Evaluation of websites

A sample of British national broadsheets was assessed using pre-defined evaluation criteria. Three categories for the evaluation were confirmed as:

Information content
- Editorial content
- Web only features
- Maximising content
- Archive

Interactivity
- Interaction. user to newspaper
- Article feedback mechanism
- A letters to the editor facility
- A staff e-mail directory
- A readers' poll
- Interaction: users to user
- personalization/customisation

Business and marketing features
- Branding
- Advertising and marketing
- Advertising
- Promotions and sponsorships
- E-commerce

Web sample

The sample included all national broadsheets in the United Kingdom which have a website, taken from the Media UK index of newspapers on the Web [9]. This included national dailies and national Sunday papers. The sample was based upon the Media UK Web Directory, as it is one of the best known directories for online media. The sample therefore included *The Financial Times* site (FT.com), *The Guardian and The Observer* website (Guardian Unlimited), *The Independent and Sunday Independent* (Independent Digital), *The Telegraph and Sunday Telegraph* site (Electronic Telegraph), and *The Times and The Sunday Times* (The Times website). The evaluation was carried out between 11th August and 11th September 2000.

Interviews

The interview questions consisted of:

1. Do you think present day newspaper websites are doing more than simply repurposing the hard copy newspaper for the WWW?
2. Which, if any, of the broadsheet newspaper websites do you think are making inroads?
3. Newspapers have not traditionally invested in research and development. Do you think that this trend will continue?
4. Do you think that a business model has emerged for the Web, or is it the case that companies will need to keep adapting? Can newspapers sustain free content?
5. Do you think that 'first moves' are crucial in the online environment?
6. How do newspaper websites compare with the likes of New Media such as AOL, MSN and Yahoo! – the most trafficked sites?
7. Do you agree with observers that newspapers should leverage their brand and capitalise on their customers' loyalty?
8. Should newspapers do as critics suggest and 'adapt or die'? If so,
    - Should they become portals?
    - Develop community publishing?
    - Develop content-related strategies?

The sample consisted of eight interviewees: one journalist, two information professionals and five people who are involved in the New Media world.

Results

Information content

All of the British broadsheet newspapers differ in the information content that they exhibit online The majority of the newspapers have simply repurposed their content for the Internet However, there are signs that this trend is beginning to change.

Editorial content

The Times and *The Daily Telegraph* appear to have put all of the daily newspaper content online. They also provide an index to all the articles that are online that day. Both newspapers have also included all the features sections available with the print edition The ElectronicTelegraph has the leaders, comment pieces, obituaries and letters to the editor on a stand-alone satellite site, which are up-dated each day. *The Independent*, however, treats its feature sections differently to the previous newspaper websites. Features are located under the navigation button entitled 'Enjoyment' and the sections do not exactly mirror those from the print version *The Independent* has made a specific section called 'Silly season' for jokes.

The *Financial Times* has made a complete departure from the accepted norm of simply re-purposing the hard copy newspaper for the World Wide Web. FT.com carries none of the editorial content from the *Financial Times* newspaper. Readers who click on the option for 'the *Financial Times* Newspaper' from the FT.com homepage, are informed by a new screen called FT Subscriptions that 'FT.com gives a lot and does a lot. But one thing it neither does nor tries to do is replicate the *Financial Times* newspaper. Some things are better done in print.'

Web only features

Most of the newspapers on the World Wide Web have made an attempt to harness the specific features afforded to them by the Web. For example, the online newspaper permits almost continuous updating. Indeed, the Guardian Unlimited and the ElectronicTelegraph, in particular, provide frequent United Kingdom and international updates. The Electronic

Telegraph also provides updated information about sport and the city and each update section gives the time that it was last revised Moreover, the Electronic Telegraph provides hypertext links to other stories they may have written on the subject, in order to supply extra information and give context to the stories.

The Guardian Unlimited also provides frequency of updating information for its breaking news section. As well as giving a time for the updating of the overall section, the Guardian Unlimited also gives each news article an updating time. The *Financial Times* does not present news stories but the majority of the information on the website is discrete, real-time information regarding stocks and shares and business.

Maximising content

All the British broadsheet newspapers have taken the opportunity to maximise the content available on their websites. FT.com has gone the furthest to offer a broad range of content. Indeed, FT.com offers news and analysis for industries and companies, information about markets, business people and time off and advice about careers and education FT.com has also included a business directory in its web service. According to one of the journalists, in his interview, 'There's almost too much on FT com, which makes it hard to navigate, and some is rudimentary.'

The Electronic Telegraph offers online users:

- **Electronic Telegraph Newsplayer Archive.** This includes video into the fabric of the news story, which gives the users a wider choice of formats.
- **Expat world** (global network) A resource of personal finance and information for expatriates on which the Electronic Telegraph advertises 'The Weekly Telegraph'
- **The Ultimate UK Business Finder.** This service permits users to search for businesses and organisations by category such as restaurants and hotels across the UK. Users can also search by town, county or postcode or by the name of the business

The Guardian Unlimited has also made an effective attempt to maximise the content of the newspaper. The network of Guardian sites around *The Guardian* hub has created a more comprehensive service. Football, Cricket, Film and Jobs Unlimited are just a few of the channels offered Education Unlimited and Books Unlimited were also launched in mid-1999 in the second wave of new websites Work Unlimited was further launched in order to keep the traditional recruitment-advertising clients with the newspaper.

Other examples of extended content on *The Guardian* and *The Observer* website includes.

- **Audio reportage**. For example, on Monday 10th July 2000, the Guardian Unlimited offered their users the opportunity to listen to an audio account from Jerusalem, following the three votes of no confidence faced by Israeli Prime Minister Ehud Barak.
- **Interactive guides**. These present a range of diverse topics and can be used as an educational tool. Topics include 'Eclipse: path across the world', 'tour the space shuttle' and 'renewable energy' [10].
- **The Wrap**. This provides a quick guide to the daily news and readers can subscribe to the service and have the brief outline of the news e-mailed to them each day.
- **The Weblogs**. This provides key articles from other world newspapers. They present noteworthy articles from other sites and 'full selected articles from current issues of our partner publications' [11].

The Times and *The Independent* also provide external links to articles and extra online special reports. *The Independent* also offers an 'Argument' section, which presents articles put forward by experts and leading writers. However, neither has developed their content with the vigour and to the extent of the Electronic Telegraph or the Guardian Unlimited.

Archives

All of the British broadsheet newspaper websites allow the reader to search their archives. Interestingly, none of the newspapers charge or ask users to register for access to their archives. The Electronic Telegraph's archive permits the reader to find articles as far back as 1994. *The Times* archive goes back to 1996, *The Guardian's* 1998, *The Independent* to 1st January 1999.

The FT.com offers a unique search service, which searches the FT.com site, a global archive, which searches 8.5 million articles from the world's top 3000 news and information sources, websites and online news. FT.com has a very impressive news collection and 1,250 articles are added every hour [12]. Users can refine their search by date, source, industry and region. Each article is accredited a rating from 'very strong match', 'strong match' to 'match'. Simon Caulkin comments 'the global archive is brilliant if rickety technically and ought to be made more of'.

The British broadsheet newspapers vary greatly in their provision of information content. FT.com has gone the furthest to re-define its content for the Web and target a specific audience. Indeed, the website and the newspaper are entirely different and separate entities. Both the Electronic Telegraph and the Guardian Unlimited have attempted to enhance their content for the Web. *The Guardian's* interactive dossiers around stories are a step towards harnessing the potential of the Web and capitalise on the newspaper's reputation for intelligent reporting. Clearly, the majority of the newspapers are still, to a certain extent, repurposing their hard copy content for the Web.

Interactivity

The majority of British broadsheet newspapers have attempted to encourage the interaction between the newspaper and the user as well as facilitate communication between the users themselves.

The Electronic Telegraph has a 'Feedback' section where users can e-mail the editor and the sports editor about current affairs, ask for technical support and give their opinions on the design, navigation and content of the website. According to the Electronic Telegraph, 'Feedback is the section of the Electronic Telegraph in which we publish the best of our in-box.' Readers are also given an issue-of-the-day to comment on and a poll gauges readers' opinions. For instance, a feedback poll in August asked 'Was the European Court right on the gay sex case?' Readers are given a brief synopsis of the case and are then asked to vote and comment upon a controversial issue.

Furthermore, The Electronic Telegraph allows readers to 'ask a journalist' a question. 'Ask a journalist' offers readers the opportunity to question leading writers and editors, such as Lord Deedes, Charles Moore and Emma Soames – editor of *The Telegraph Magazine*. For instance, questions to Emma Soames included 'Have you ever recognised yourself in one of your magazine's social stereotypes?' and 'How can I get into the world of journalism?' Thus, allowing readers to interact with the newspaper staff on a completely different level.

The Independent offers an article feedback mechanism by way of its 'right to reply' section. This is a platform for individuals or organisations referred to in articles appearing in *The Independent* who want to comment upon the article. For instance, on 31st August 2000, Derek Smith, the Managing Director and Chairman of London Underground, responded to an article by Ken Livingstone about safety on the tube.

Four out of the five British broadsheet newspapers online allow readers to communicate with one another through discussion forums. The FT.com discussion forum can be found under the 'Community' section. The discussion forum covers a wide variety of subjects as diverse as consumer industries to special interest, such as 'drinking with workmates'. Users are not required to register in order to participate and can search the discussion forum

The Guardian Unlimited site has also invested a lot of time into discussion forums. There are eight Talkboards on the Guardian Unlimited network. Live Online, according to Guardian Unlimited, gives people the chance to 'talk about the biggest issues ... with the people who make the decisions. You can put questions to Cabinet Ministers, Guardian journalists and film directors.' [13]

Personalization

Only FT.com really allows users to personalise their site. The FT.com's 'Personal Office' service gives users.

- Calendar – which helps users manage their appointments.

- E-mail – free e-mail account offering unlimited e-mail storage and a password. According to FT.com 'You will soon be able to access your e-mail via your mobile phone! Watch this space! [14]'
- Files – a free file storage area for 15mb that provides remote access to working documents.

Moreover, in future, FT.com aims to provide users with FT Viewer which gives them the ability to download files and attachments stored in their Personal Office account even if the PC does not have the appropriate applications. Furthermore, they intend to introduce e-mail alert which will pop-up to inform people that new mail has arrived and synchronise Personal Office with other devices such as Palm Pilots and Outlook Express, in order to share and import information.

Business and marketing features

All of the British broadsheet newspapers have made some attempt to incorporate some advertising and e-commerce features into their website.

The *Financial Times* has clearly positioned their company logo strongly on their website. However, FT.com has also made a departure from the offline environment by calling the website FT.com. This leverages the *Financial Times* offline brand and tailors it for the Web without disregarding its traditional value. The altered branding for the Web and the total departure from the service of the newspaper gives it credibility in the online world.

The Daily Telegraph, like the *Financial Times*, has also altered its name for the Internet. This signifies to the user that the newspaper has reassessed its role and services for the Web. The Electronic Telegraph has also kept the logo and the house style similar to the print version so that users can associate it with the newspaper. *The Daily Telegraph* has omitted the 'Daily' from its domain name of www.telegraph.co.uk as this would imply that the information on the Web was only updated daily, instead of virtually real-time information with which the Internet is synonymous

Advertising and marketing

All of the broadsheet newspapers use banner advertising on their websites and most have devoted several pages on their websites to encourage businesses to advertise on their site. FT.com and the Electronic Telegraph devote entire sections of their websites to their respective advertising and marketing offers. FT.com explains that they provide 'a full range of banner advertising which includes top banners and side bars' [15]. They also outline the reason why advertisers should display their adverts on FT.com.

> FT.com is a magnet for high-earning, ambitious business professionals ... FT.com has over 2 million registered users in 239 countries, and an average of one million unique users per month [15].

Banner adverts on the Electronic Telegraph site appear on the home page, the index pages and the story pages. The Electronic Telegraph asserts that 'We can help you choose the pages the ad will appear on so that you can reach the right audience.' [16] Indeed, they also assert that they can tell a company at any time how many page impressions and clicks through that their advert has achieved.

The Guardian and *The Observer* also make use of banner advertising and they also put an advert on the part of the network where the users will be most appropriate to the advert. For example, according to the Guardian Unlimited, 74% of Football Unlimited users are males and therefore, male orientated adverts would be most suited in this section. *The Independent* also dedicates many of its web pages to adverts. *The Independent* also advertises subscriptions to the print edition on its website and its other services such as 'The Independent Travel Shop'. *The Times*, like *The Independent* dedicates much of its advertising on its own products.

Sponsorship

In terms of sponsorship, *The Guardian* and the Electronic Telegraph are worth a mention. The Guardian Unlimited site divides sponsorship on the website into eleven different categories [17]. These include:

- **Existing content sponsorship** – for example, live scores brought to the user in association with a particular sponsor, usually including a link to their website.

- **Section/feature sponsorship** – in the Nike grass roots 'Park Football' campaign, *The Guardian* offered niche targeting as 'they had sponsor logo buttons on specific clubs within the Clubs area of Football Unlimited'.
- **Search facility sponsorship** – for example, film searches.
- **Crossword sponsorship**
- **Bespoke special report** – specific news reports, for instance genetically modified crops, which include articles and adverts.
- ***E-mail text message*** – the news summary service, The Wrap, which can be sent via the Internet or via WAP, carries top and tail advertising opportunities

The Electronic Telegraph also allows companies to align their brand to one of their high traffic sites Companies can sponsor a particular section of the Electronic Telegraph, one of its associated publications or will even create a new micro site to enable them to target a specific market. Indeed, the on-site sponsorships are designed to attract and tap into the newspaper's audience.

E-commerce

All of the newspaper websites, with the exception of *The Times*, have a section on their sites dedicated to shopping. Products range from books, travel and music. The Electronic Telegraph has a 'best of British' online department store, where users can purchase from a number of British retailers, including Whittards of Chelsea and Molton Brown, the cosmetic company. *The Independent* has a '50 of the best' section, where they have suggested products, such as the best clothes for babies, swimwear and 'funky furniture'

The evaluation of e-commerce on the newspaper websites revealed that broadsheets had made strategic partnerships with retailers. Each newspaper had aligned itself with products that reflect what they believe their audience would like to purchase By way of illustration, as the *Financial Times* targets professionals it offers online wine and travel on its website.

Interview results

Repurposing the hard copy newspaper for the World Wide Web

Most of the interviewees felt that British newspaper sites were simply repurposing their hard copy for the Web. One interviewee felt that they were making some attempt to make a break from their print version. She commented 'some articles are specifically written for the Web ... also you can access up-to-date news as it breaks around the world.' Another interviewee stated that although, on the whole, he feels that newspaper websites are not really making a break from their print editions, he does feel that '*The Guardian* and FT.com come nearest to doing something new. Obviously, the opportunity exists to do something more than just publish news stories, and *The Guardian's* dossiers around subjects are a good start.'

One of the New Media professionals took a similar line He believes that newspapers are not doing enough to make the most of the Web. However, he does acknowledge that:

> the papers have kept up in terms of interactive content that can be created by webmasters – quick polls, pop-up fact boxes etc, but users now want graphical content, audio, video, live-mail exchanges with newsmakers... here the papers suffer a severe disadvantage as they don't automatically collect or manage such content.

Another New Media specialist feels that some of the newspapers, for instance *The Times*, are doing nothing more than simply putting their hard copy online

Broadsheet newspaper websites making inroads

One of the New Media professionals identified FT.com, *The Guardian* and Independent Digital as newspapers who had reassessed their strategy and raison d'être for the Web. He stated that, 'these newspapers have analysed what they do for a living'. Another interviewee also believed that The Guardian Unlimited and FT.com came the closest to capitalising on the interactive features of the Web He believed that FT.com is making inroads on the Web as it has targeted a specific community of users and has delivered timely and relevant services to its users. For instance, the FT Personal Office provides those in business with essential packages for their working day and that FT.com has developed a very 'loyal user base'. One of the information professionals asserted that the newspapers are honing their advertisements on the Web and websites, such as FT.com, are embracing new cutting edge advertising. For example, she cited the banner adverts and special offers which are placed carefully on the newspaper websites to attract those users who are likely to be interested in a certain product or service. Indeed, companies can advertise on a website as part of an integrated advertising campaign.

Newspapers investment in research and development

All the interviewees felt that research and development for a company on the Internet is a necessity. One journalist in particular summed up the general opinion when he said that, if newspapers continue to ignore research and development 'they're toast, or fish and chip wrapping' He further asserted that newspapers must start 'thinking like venture capitalists, who know that of 10 investments (i.e. options) four will be outright failures, another four will just about break even, and two will be mega and pay for all the rest.' Another felt that newspaper websites are research and development, as they have invested a great deal of time and money into analysing who their users are and who to target for advertising and e-commerce.

Business model for the Web

The majority of the interviewees were unsure as to whether a business model had emerged on the WWW. They all agreed that there did not seem to be one clear model, with the possible exception of AOL and Yahoo. Perhaps this shows that even those involved in the Internet world are unsure of where it is going in the future. One interviewee believed that there are many business models present on the WWW. He asserted that newspapers must be prepared to constantly adapt themselves to changes in business. Thus, he stressed the importance for newspapers to have a flat structure in order to keep evolving and innovating. By flat structure he means that all members of staff should be able to contribute their opinions and ideas, regardless of their position in the company.

Regarding free content, he was not convinced that newspapers could sustain this practice. Especially considering that cover prices for print copy newspapers have not risen recently and that the competition for classified advertising is now fierce. He cited in particular the practice of *The Guardian* to allow free distribution of their content to other websites.

First moves crucial in the online environment

One interviewee stated that 'newspapers have to be in there experimenting and trying to make others adapt to their model, rather than having to chase to someone else's game'. This view is also held by another journalist who commented that 'first moves establish brands as a player'. However, he did not believe that it is fatal to be a step behind in the online environment. Just that it is crucial to keep up with developments in technology and New Media.

Newspaper comparisons with the likes of New Media such as AOL, MSN and Yahoo!

As an information professional, one interviewee believed that, in comparison to the large portals, newspaper websites have a more rigid structure to them. She stated 'I find the newspaper websites easier to get around but then that's because I generally know what I'm looking for.'

Several of the New Media professionals highlighted the high level of technology employed by the portals in comparison to the newspaper websites. They argued that the portals are now building a critical mass of text, video, pictorial and audio content, as well as graphics and innovative interactive ideas with which to conquer the traditional advantage of newspapers The Web professional also explained that newspapers would soon face the challenge of broadband technology, which will make video and audio transfer far simpler and user-friendly. He argued 'broadband will be the next generation of Internet – like the move to colour television – and papers will need to forge strategic alliances with content providers to fill the voids they will face or they will not remain relevant.'

Newspapers leveraging their brand and capitalising on their customers' loyalty

The resounding opinion from the interviewees was that newspapers need to leverage their brand in order to succeed in the online world. However, one of the New Media professionals felt that 'big brand names like the London Times, New York Times or international publications could trade off their mastheads with some success but papers are regional and the net is international.' Thus, he concluded that newspapers should concentrate specifically at aiming newspaper websites to a local market One of the journalists stressed the need for newspapers to make the most of their brand names, with the exception, however, of *The Daily Telegraph*. He commented 'newspaper brands are perversely both immensely durable and badly underexploited.' This led him to express his opinion that newspapers also badly undervalue their journalists – who are perhaps their most valuable assets.

Adapt or die

If the latter.

- Should they become portals?
- Develop community publishing?
- Develop content related strategies?

After analysing the responses it became evident that the interviewees were envisaging a combination of the possibilities rather than choosing any one option This was contrary to what the researcher had expected but shows that there is no single answer to the future of newspapers on the WWW Two things, however, became clear from the interviews:

- the emphasis given to a local strategy (national or regional) rather than trying to compete on a global level and;
- the importance of making a choice and acting upon it!

There was a particular emphasis placed by the interviewees upon the fact that newspapers should develop community publishing. The web developer commented that many newspapers in the United States have branched into community publishing. He asserted that newspapers needed to concentrate on the fact that they provide high quality information for a local area. For many of the major portals provide generalised content which users in the United Kingdom do not feel are relevant to them.

One of the New Media professionals, like the rest of the interviewees, saw a combination of community publishing with a content-related strategy as the way forward for newspapers He stated that 'what will probably happen is more localised partnering between smaller, local portals or ISPs, and newspapers'. He stated that a news search function on a portal would work well. For example, 'something like a Yahoo/NewYorkTimes news search'.

The publisher was not convinced that newspapers should try and compete as portals and again emphasised the need to concentrate on a local audience. She believed that the major portals, such as AOL and MSN, are faceless and do not add any context or meaning to the information they disseminate. She felt that newspapers should use the trusted relationship they have with their users to develop interactive dialogue with communities of users. For instance, she cited the case of the Electronic Telegraph, which has developed a community for expatriates who wish to keep in touch with news and events in the United Kingdom. This she said has built a strong community forum. She further asserted that during the solar eclipse most of the newspapers successfully created a community of interest concerning how the eclipse would come over the United Kingdom. Indeed, minutes after the lunar shadow left Great Britain a picture from the Guardian Unlimited could be downloaded by users.

One of the New Media professionals felt that the future for newspapers on the WWW is for them to become vortals. Vortals meaning the targeting of a specific community of interest. For example, the specialising of a newspaper on the commentary and analysis of British news. Thus the site would concentrate on in-depth news and reviews for a local community. He commented that although content is a key driver, engaging with people should be the essence of an online newspaper. However, he acknowledged that the content aggregation strategy cannot be ignored; for some of the big online players, such as telecommunication companies, will have to buy up content, which may entail the purchasing of a newspaper.

Another New Media specialist suggested that 'the biggest issue that many people face is the personalization tool, and how to define the fields that people have access to' He suggested, as did one of the journalists, that the competition they face is from New Media companies who are 'making the first steps towards My Newspaper'

Conclusions and recommendations

The print newspaper will undoubtedly continue to play an important role in today's society One need only catch the morning train to see the number of people busily reading the latest news and reviews from their favoured newspaper to confirm this. Ironically the future for the newspaper on the WWW is not so certain. The Internet, and the plethora of start-up companies that it has spawned, has led to an unprecedented and unstable environment for the majority of companies. There are now a great number of websites that disseminate news and add value to it. Newspapers, whose bread and butter is essentially news, have found themselves virtually eclipsed by the major portals and competing against new and innovative companies.

The web evaluation and interviews concluded that there are many good things coming out of newspaper websites, such as from FT.com who allow their users to store files, access real time information and enter into discussions with others regarding contemporary issues. The rest of the British broadsheets might be advised to follow FT.com closely, as they seem to have targeted a specific audience and successfully re-evaluated their services for the Web. They must ask themselves what do we really want for a living and how can we translate this into a viable strategy for the Web? However, newspapers still find themselves lagging behind many other websites. Indeed, interviewees stressed that newspapers do not have the technology to keep up with advancements in New Media Four recommendations can be made after the website evaluation and the interview responses. Newspapers should·

- Concentrate on local content.
- Facilitate community publishing.
- Invest in research and development
- Develop a strategy and act upon it.

As the WWW is constantly changing up-to-date research is critical Research projects such as this can only provide a snapshot of what is happening at one time. Investigations into possible developments for newspapers need to be carried out on a regular basis in order for executives to make informed decisions. Moreover, newspaper executives are particularly concerned that they do not know the identities of their online users and it would be useful for further studies to be carried out regarding public opinion and use of newspaper websites Research could look, in particular, at use of online newspapers by young people who are heavy consumers of New Media.

No one can predict the future of the WWW and it is a well known saying that futurology is a very dangerous art. But newspapers should heed warnings that they themselves must invest in research and development. Most importantly, newspapers have no choice but to develop a strategy for their online presence. One of the journalist's words was particularly pertinent:

> What is certain is that they must choose to do something, rather than just sit there and wait for their world to crumble slowly around them . . .

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New information perspectives

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'DESCRIPTION' META tags in locally linked web pages

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Advice given in printed and web-based sources on HTML META tags with NAME='DESCRIPTION' is surveyed. To determine patterns of relationships among descriptions on the same site, links were followed automatically from 460 pages registered with Yahoo! and previously found to contain descriptions. Sites where the registered page pointed to many other pages were significantly less likely to reuse the same description on those other pages; where different descriptions were used words from the registered page's description tended to appear toward the beginnings of other descriptions.

Introduction

This article reports on further work designed to extend a preliminary investigation [1] into how people and organisations summarise their own web pages and, specifically, how and to what extent they make use of META tags, especially those with NAME='DESCRIPTION', for this purpose.

The background to this investigation was the author's research over a number of years aimed at developing a prototype computerised abstractor's assistant [2, 3, 4, 5, 6] As a kind of writer's assistant, such a software package includes a simple word processor and other general writer's tools [7], with their functioning specially adapted to fit the needs of abstractors and writers of other kinds of short summaries. In addition, the package integrates tools, such as an automatic extractor, related specifically to the task of summarising. Apart from the author's own work, Paice [8] has given a list of desirable features for such a package.

A hybrid system, in which some tasks are performed by human abstractors and others by software, appears to be an appropriate short term goal, since purely automatic abstracting methods [8-11] do not show immediate promise of totally superseding human effort.

The World Wide Web Consortium's official definition of HTML [12] includes the META tag, which may be used to include various types of information about a page or site. The type of information is broadly identified by the tag's NAME attribute, which may have various values. There are indications that the HTML META tag with NAME='DESCRIPTION' (for convenience, referred to hereafter as the 'DESCRIPTION tag') is at least sometimes seen as equivalent to an abstract. For example, Pfaffenberger and Gutzman [13] state that the content of this tag is a 'narrative description or abstract of the page'; likewise, in Corel WordPerfect [14] the contents of the 'abstract' property of a document are copied into the DESCRIPTION tag when exporting to HTML format. Christensen [15] defines the DESCRIPTION tag's contents as 'including abstracts in the case of document-like objects, such as an online newspaper article, or content descriptions in the case of visual resources'.

This article will begin by surveying advice given by various sources, both printed and web-based, on how the DESCRIPTION tag should be constructed and applied. It will then report on a study of one aspect of the actual application of the tag: the relationships among DESCRIPTION tags in different pages on the same site.

At least two possible benefits are expected from the study of web page authors' actual practice in summarising their documents in

META tags. The first of these is to the design of software to assist the authors in tag generation; this expectation is based in part on an assumption that author created descriptions will reflect features that authors and other users may consider desirable. The second anticipated benefit is to browser design: to know whether introducing a feature to display the description, as, say, the title is commonly displayed in the caption bar, would in fact benefit visitors to a substantial number of websites (compare Beagle [16])

Other aspects of the content of web pages have been studied by various researchers To take a few examples, King [17] studied page layout of library home pages; Haas and Grams [18] concentrated on characteristics of the anchors found in randomly selected pages; Almind and Ingwersen [19] applied informetric measures, Harter and Ford [20] studied links to e-journals and their articles.

Survey of advice

Microsoft [21], among other sources, notes which of some major search engines use META tags and which do not Services that specify that they do not look at META tags include Yahoo! [22] and Excite [23] A number of search services that do consider META tags, as well as web page registration services, make different recommendations regarding describing a web page when submitting its URL, and other sources of information on META tags also give various advice on, and examples of, the DESCRIPTION tag.

The addition of META tags is often recommended in order to improve the chances that a page will be retrieved, but this advice may apply more to some tags than to others. In an experiment by Turner and Brackbill [24], addition of a META tag with NAME='KEYWORDS' improved retrievability of web pages on Infoseek and Altavista, but that of a DESCRIPTION tag did not Some sources warn against spoofing (e g., word repetition or tags unrelated to actual content) on the grounds that it may result in downgrading of the page by the search engine [25]

Which pages should be assigned descriptions? Vancouver Webpages [26] and Everpoint Inc. [27] state that a description is 'Particularly important if your document has very little text, is a frameset, or has extensive scripts at the top.'

Regarding length, various sources set a limit of 200 characters [28] or warn that many search engines use only the first 200 characters [29, 30] The META MEDIC tag checker [31] warns if a description is more than 200 characters in length (though it recommends that the keywords be between 300 and 500 characters). A number of sources set lower limits:

- International Website Builders [32] – 180 characters;
- HotBot [25], MultiMedia Associates [33], PHD Software Systems [34] and Carroll [35] – 150 characters;
- Read Southwest [36] – 140 characters;
- Holzschlag [37] – 120 characters;
- the University Corporation for Atmospheric Research [38] and VanDerLee [39] – 100 characters

A few set the limit somewhat higher, for example, the FIREBALL meta tag generation service [40] specifies a maximum length of 256 characters. A more absolute technical upper bound of around 1000 characters is widely cited as well Length may also be measured in words, for example, 'under 50 words if possible' [41], around 25 words [42], 25 words or less [43], or 15-20 words [44].

Vaguer characterisations of length include 'short' [26, 27, 45, 46], 'up to a paragraph' [47], 'a concise sentence or two' [48], 'a short descriptive sentence' [33], 'one sentence' [38], and just 'concise' [49, 50] or 'succinct' [41] Also suggesting conciseness is the specification 'as much information as possible within the constraints' [35]. Somewhat by contrast, the New Mexico State Library [51] says that the description may be 'as long or as short as you need'.

In terms of function, Dr. Clue [47] indicates that a description 'should enable the person looking at it to easily determine the content (and thus their interest) of the series of documents it leads into'. Keller [52] says to consider the description a 'hook' to 'make readers keep reading'; Read Southwest [36] similarly sees the description as an enticement to visit; Azurii Designs [41] says that a description should be 'attractive'

As far as content is concerned, Ffolliott [53] and the New Mexico State Library [51] state that the description should indicate the purpose of the document. Some sources recommend that the description reflect the content or subject of a specific page or document [54-57]; others, that it should summarise or reflect the content of an entire site [38, 41, 58-60] Hobstetter [44] says that it may do either; VanDerLee [39] that it may be either about the page or about the page's relation to the rest of the site One source [43] states that the description should describe products. Aesthetic Design by Laisha [61] warns against including empty passages like 'come in and see our website' as well as specific pricing information, but recommends a fair degree of specificity. Hunter [59] also warns against including 'fluff'.

Advice on the content of DESCRIPTION tags is certainly less standardised than that for scholarly abstracts, for which there is a NISO standard [62]. The NISO standard specifies that informative abstracts, which are generally used for reports of experimental investigations, inquiries, and surveys, should state the purpose, methodology, results, and conclusions. Even for scholarly works, however, such content categories may not all be appropriate. The work of Tibbo [63] indicates considerable variation in abstract content types between disciplines. We may also compare other work on the content and language of abstracts by Salager-Meyer [64] and Kaplan *et al* [65].

Regarding the language of the DESCRIPTION tag, Vancouver Webpages [26] and Everpoint Inc. [27] define the description as being in 'plain language'. Aesthetic Design by Laisha [61] says to use the third person and to match the language to the language of the site (e g Polish for a Polish site). Sullivan [66] warns that those using trademarked terms in META tags in what seems a deceptive manner may be subject to lawsuits Various sources (for example Hobstetter [44]) mention that the description should be in sentence form.

Several sources advise authors to include a number of their keywords in the description [41, 58, 67, 68]; Multimedia Associates [33] says 20-25 keywords; Hunter [59] says 'many'. Navarro and Khan [68] say that this may improve retrievability. AAA Internet Promotions [30] and VanDerLee [39] advise putting the most important words at the beginning; InformationToday [50] also recommends placing the most important information near the beginning Conversely, VanDerLee [39] advises against including too many common words, such as 'has' or 'and'. Impressa Systems [69] and SAQ Net [70] state that using the same words in the description as in the first 200 words of the page will increase retrievability with some robots. Ffolliott [53] and Aesthetic Design by Laisha [61] note, on the other hand, that the description should not be the same as the title.

Navarro and Khan [68] advise placing a company name in the description. PHD Software Systems [34] advises ending the description with three dots ('..') in order to encourage the searcher to look at the page. International Website Builders [32] actually recommends the inclusion of misspelled words, if space permits, at the end of meta tags, though this advice would seem to apply more to the keywords than to the description.

The normal assumption appears to be that the description is written by the author of the page, for example World of Media [55] cites this as a reason for deeming the description accurate.

DESCRIPTION tags presented as samples by the sources show various patterns Some contain what appear to be formulaic elements:

- a noun phrase, beginning with 'Home page for', indicating the type of page and briefly identifying the subject matter;
- a noun phrase consisting of 'Home page for' plus an acronym for an organisation [71];
- a 13-word statement about the page, beginning with the expression 'This page is about [67],
- a brief phrase describing the site followed by a command beginning with 'Visit us to learn about' [72],
- a phrase identifying the institution followed by a command to 'Visit our home page for [a list of services]' [73],
- a pair of statements of the form 'This is ..'s home page Here you'll find...' [56];
- a short description of information content beginning with the expression ' Everything

you wanted to know about' [74, 75].

Non-formulaic sample descriptions include the following:

- a longer phrase describing the site followed by a shorter phrase describing one of the services available [42];
- the type of company and the city in which it is located [21],
- three complete sentences followed by a substantial verb phrase [76];
- a single sentence describing a scene from a book [39],
- a 35-word noun phrase describing a site's contents, with plenty of keywords [23],
- a 3-word noun phrase describing a company [26];
- a 7-word phrase describing the contents of a page [77];
- a 27-word verb phrase describing the content of a site [49];
- a 28-word statement about the company followed by a noun phrase ending in an exclamation point [59],
- three sentences about the company, with several repetitions of key words [70];
- a 14-word statement of what a product will do [41],
- a 10-word statement about what a store will do [60].

Software products designed to assist in web page creation rarely provide any aid in creating DESCRIPTION tags. A partial exception is Corel WordPerfect, as noted above. Microsoft Word 2000 [78] allows a 'comments' property to be added to a document, but exports this to HTML in embedded XML code (Word 97 [79] exported the comments as a META tag with NAME='DOCCOMM'). A number of packages allow a 'comments' property, but do not export it to HTML. Of the top four downloads from download.com (August 2000), Coffee Cup and Hot Dog Pro offer very brief advice about the DESCRIPTION tag, and Hot Dog Pro provides a box for entering it, but Dreamweaver and HomeSite make no mention of descriptions Other packages that provide a box for entering the DESCRIPTION tag include Corel Web.Designer [80]. The author has recently added the capability of editing DESCRIPTION tags to his prototype abstractor's assistant [81]. The GenePage software [82] uses a list of web pages to generate automatically a home page that includes a META tag with NAME='KEYWORDS', but not a DESCRIPTION tag

It has been noted that there is also a DESCRIPTION element in the Dublin Core [83], defined as 'An account of the content of the resource', with the further comment that it 'may include but is not limited to. an abstract, table of contents, reference to a graphical representation of content or a free-text account of the content'. As a META tag, this element appears in standard form with NAME='DC.DESCRIPTION'.

Linked descriptions

Background

In order to estimate the total variety of use of the DESCRIPTION META tag, it was considered desirable to obtain a broad, representative sample of publicly available web pages, and especially of those pages that employed META tags and the DESCRIPTION tag in particular. A survey of 42 search engines (in December 1999) [1] had showed no feature on any that permitted searching for specific META tags. In terms of sampling web pages in general, Askjeeves and Webcrawler permitted peeking at sample queries, OpenDirectory selected random categories if an empty query was entered, and All-In-One's 'What's NewToo' option showed the day's announcements of new pages

A preliminary study [1] in the winter of 2000, using customised web-access software, had found 163 pages with DESCRIPTION tags out of 626 successful downloads from the Yahoo! random page service. A follow-up study in the summer of 2000, using the same software, had found 319 DESCRIPTION tag pages out of 832 downloads from the random page service. In addition to these pages returned immediately by the random page service, the follow-up study also involved downloading and analysing like numbers of pages reached by randomly selected links from these 'level-1' pages

Among the results of these earlier studies were the following: some of the descriptions greatly exceeded typical length guidelines of 150 or 200 characters, a minority duplicated exactly phrasing found in the visible text, with most repeating some words and phrases; contrary to advice, pages with less visible text were less likely to have descriptions; keywords were somewhat more likely to appear nearer the beginning of a description than nearer the end; noun phrases were more common than complete sentences, especially in non-registered pages.

Purpose

A further study was designed to answer several questions about how descriptions are applied to different pages on the same site. Is a description given only for the home page, or do other pages receive descriptions? In the latter case, to what extent is information from the description of one page repeated in the descriptions of other pages? How much are words, phrases, or even whole descriptions repeated from one page description to another? If words or phrases are repeated, are certain patterns followed more commonly than others? For example, do descriptions tend to begin with the same or similar information and postpone information specific to the individual pages to the end? Or, do they tend to place the specific information first and add the general information at the end to place the specifics in context?

Although a website is not necessarily like a journal article, it may be of interest to compare how an abstract covers the parts of an article. An abstract normally serves for an entire article, the individual parts of which do not have abstracts Some journals do publish 'structured' abstracts, with distinct, labelled, sections for the major parts of the article For example, the *Annals of Internal Medicine* [84] recommends the following section headings for articles reporting original data from clinical investigations with human subjects· Objective, Design, Setting, Patients *or* Other Participants, Interventions, Main Outcome Measure(s), Results and Conclusions. Nevertheless, the parts are all printed at the beginning of the article and not with the individual sections to which they belong.

Methodology

URLs were taken for 460 pages (141 pages identified in the preliminary study and 319 pages from the follow-up study) previously found to contain DESCRIPTION tags. A specially written program was used by a research assistant to attempt to download and analyse the page corresponding to each of the URLs and all the pages to which it was directly linked. Summary data collected for each URL attempted included the following counts for linked pages in the same directory that could be downloaded (minus any inline images or the like) within 30 seconds: number with no DESCRIPTION tag; number with a description different from the description on the original page; and number with a description identical to that on the original page. For descriptions that were different, the mean densities of words and of two-word phrases from the original page's description were also computed.

The downloaded linked page descriptions were subsequently analysed for the mean position of exact matches to any words in the base description and also to any words in the base description that were not on a stoplist. The use of the stoplist was included as a test for possible bias created by the structures of phrases and sentences in English, where, for example, several common stopwords, such as the definite article, show a general tendency to appear toward the beginnings of sentences

The research assistant also coded the syntactic structure of the descriptions in both the base pages and their linked pages. For purposes of syntactic coding, as in the earlier studies, each description was generally considered to be divided into segments by sentence-level punctuation marks· periods, exclamation marks and question marks. Each segment was then categorised as a noun phrase or sequence of noun phrases (**n**), a verb phrase or sequence of verb phrases (**v**), an adjectival or adverbial phrase or sequence (**m**), a sentence in the indicative mood (**s**), a sentence in the imperative mood (**c**), or other (**o**). For example, the description ' Marshall Media produces high-quality CD-ROMS for children and adults. Order online from our shop' would be coded **sc**. An earlier consistency test had shown that the assistant's coding agreed 90.8% with the researcher's of all codings and 95 4% when all codings except

Table 1 *Patterns of descriptions in linked pages*

		None without description	At least one without description
No description same as base description	No description different from base description	62	*99
	At least one description different from base description	*38	38
At least one description same as base description	No description different from base description	*46	66
	At least one description different from base description	20	35

* Categories that show uniform practice across all linked pages

n, **nn**, **s**, and **ss** were collapsed into a single 'other' category.

Results were examined for any patterns of relationship between syntactic structures used in base pages and linked pages on the same site with different descriptions. To avoid lumping effects of base pages with many links, tabulation was applied for each base page to the last of these same-site linked pages only, with a reliability check using first same-site linked pages.

Results

Download attempts succeeded for 117 of the pages from the preliminary study and 289 from the follow-up study. Of these, 11 (or 9.4%) in the first set and 9 (or 2.8%) in the second set were found to have no descriptions (or DESCRIPTION tags with no content). Although some of the cell sizes are rather small, a chi-square test shows the difference between the sets to be statistically significant (p=0.0042).

Table 1 summarises the different patterns shown by the sets of linked pages The top left value of 62 means that there were 62 base pages without any local linked pages that could be downloaded.

A negative relationship was observed between the number of same-directory links and the use of the same description in linked pages. For all 14 base pages with more than 29 same-directory links, the proportion of linked pages with the identical description was less than 7%. By contrast, only 180 out of 391 base pages with 29 or fewer same-directory links met this criterion. A chi-square test showed this difference to be highly statistically significant (p=0.0001).

No significant relationship, either positive or negative, could be discovered between length of URL and use of descriptions in linked pages. Figure 1 shows the distributions of the average densities of base description words and 2-word phrases in descriptions in the corresponding same-directory linked pages

The following are two examples from near the middle of the distribution:

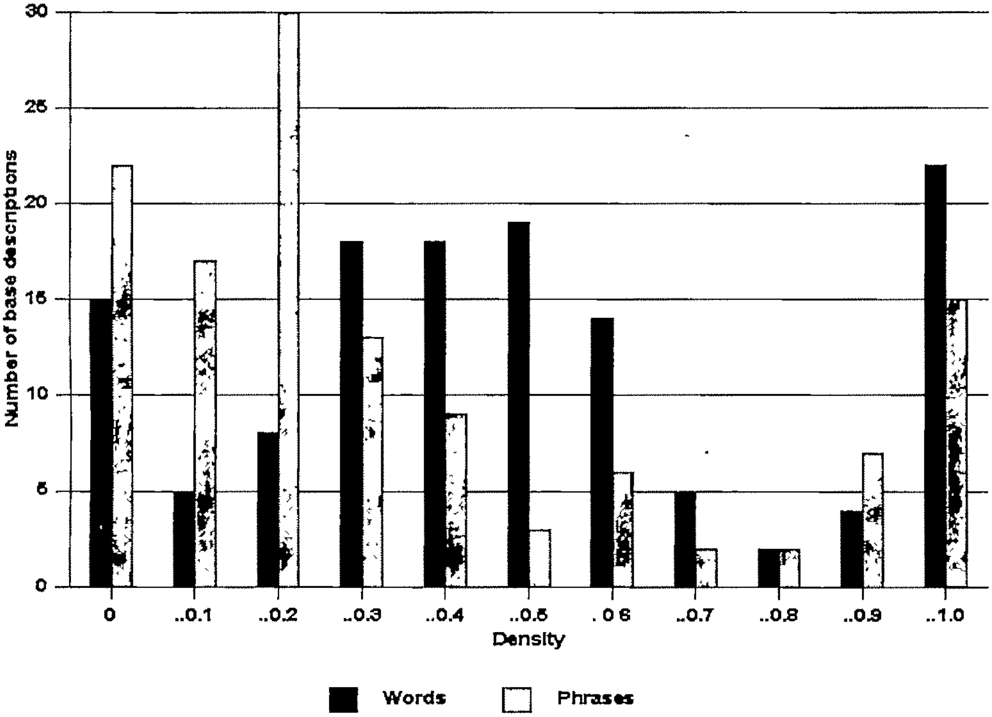
Base page description

Many business opportunities offered to start your own home based business. Over 3500 fast selling, high quality items in a full colour catalogue that creates many business opportunities.

Different descriptions on linked pages

1. Many business opportunities offered to start your own home based business. Full colour

Figure 1. *Distribution of average densities of base description words/phrases*



catalogue with over 3500 fast selling, high quality items that create many business opportunities.
2. Start your own business as a wholesale merchandiser. No inventory required. 4000 fast selling, high appeal items in full colour catalogue (2 URLs).
3. Offering many DVD titles in our association with Amazon.com.
4. Over 3500 beautiful gift items from all over the world.
5 Make your own candles, candle moulds, flower presses, and all natural cosmetics.

Base page description

Steamboat Springs finest ski-in/ski-out luxury condominium lodging. Full kitchens, laundry, fireplace, pool, hot tub, sauna and shuttle at your disposal.

Different descriptions on linked pages

1. Amenities of the Chateau Chamonix in Steamboat Springs, Colorado.
2. Area map featuring the location of the Chateau Chamonix in Steamboat Springs, Colorado.
3. Nightly rates for the Chateau Chamonix in Steamboat Springs, Colorado.
4. The Mont-Blanc Conference facilty *(sic)* at Chateau Chamonix in Steamboat Springs, Colorado.
5. Business Center Services of the Chateau Chamonix in Steamboat Springs, Colorado
6. Affordable luxury at the Chateau Chamonix in Steamboat Springs, Colorado.

7 Use this online reservation request form to make your plans to stay at the Chateau Chamonix in Steamboat Springs, Colorado.
8 Rates and policies for the Chateau Chamonix in Steamboat Springs, Colorado.
9. Additional photo's of the Chateau Chamonix, Steamboat Springs, Colorado.
10. How to contact the Chateau Chamonix, Steamboat Springs, Colorado.

An example from the high end of the distribution follows

Base page description

AgriZap, Inc. – Electronic mouse and rat traps that kill mice and rats with a deadly shock, Humane rat traps, Electronic traps for rodents, Environment friendly Rodent Traps for Rodent Control and Pest Control Rat Zapper by AgriZap, Inc. – Electronic mouse and rat traps that kill mice and rats with a deadly shock, Humane rat traps, Electronic traps for rodents, Environment friendly Rodent Traps for Rodent Control and Pest Control.

Linked different descriptions

1 Fireworks Splice HTML Rat Zapper by AgriZap, Inc. – Electronic mouse and rat traps that kill mice and rats with a deadly shock, Humane rat traps, Electronic traps for rodents, Environment friendly Rodent Traps for Rodent Control and Pest Control
2. Rat Zapper by AgriZap, Inc. – Electronic mouse and rat traps that kill mice and rats with a deadly shock, Humane rat traps, Electronic traps for rodents, Environment friendly Rodent Traps for Rodent Control and Pest Control. (3 URLs)

An example from the low end:

Base page description

Matthew McConaughey News, Biography, Credits, Movies

Linked different descriptions

The Mr Showbiz Movie Guide (16 URLs).

Base description words were significantly more likely to average closer to the beginning than toward the end of linked descriptions (in a ratio of 59 to 31, giving a significance of 0.0316 in a chi-square test). When stopwords were excluded, the tendency actually increased slightly (with a ratio of 64 to 26, giving a significance of 0.0001 in a chi-square test). Application of the stoplist had relatively small effects in many cases. The most extreme movement of the average match position toward the beginning was of about 23%, caused mostly by the dropout of one description (out of two), where the only match had been of the stopword 'an'. The most extreme movement in the other direction was of about 36%, where seven short linked descriptions all followed the example of the base description in starting with 'about'.

The proportion of descriptions consisting of one or two noun phrases only (coded **n** or **nn**) increased significantly from the base to the last linked same-directory page with a different description (from 37 out of 104 to 57 out of 104, for a chi-square significance of 0.0053) This represented some moves (9 cases) from simple indicative-mode structures (one or two indicative mode sentences coded **s** and **ss**), but more from other structures (12 cases). The validation check of first linked pages showed similar results.

There was a strong relationship between the numbers of syntactic units in base descriptions and in linked same-directory descriptions (with a chi-square significance of 0.0000 for a two-by-two tabulation of single-unit versus multiple unit descriptions). Linked descriptions tended to have simpler syntactic structures, but this difference was not statistically significant.

Discussion

Although failure to download was generally detected by the software as a timeout, it is doubtful that increasing the time limit would in fact have improved the success rate significantly. In a sample of 154 successful downloads, for instance, only one took longer than 12 seconds, and only 13 took longer than 5 seconds Scanning of the detailed log file indicates that most download failures were for linked pages on other directories or other servers than the base page and were thus not directly relevant to the purpose of this study. There were a few exceptions, however, such as http://www.tescotank com:80, where the server delivered the base page, but all eight linked HTML pages on that server timed out.

The time differences between the two sets of URLs used, together with the difference in the proportion of pages returned that no longer contained descriptions, suggests that pages may be losing descriptions at a rate of roughly 1% a day (presumably as part of the process of updating). This does not necessarily represent a net decline in the use of the DESCRIPTION tag, however. Indeed, the increase in the proportion of pages with descriptions between the preliminary study and the follow-up study, noted above, would suggest the reverse: that, although some pages cease to contain descriptions, new pages with descriptions are being created, or descriptions are being added to old pages at a greater rate

In many instances, the reason that at least one of the descriptions of a linked page was the same as the base page description may have been that the two pages were in fact the same, even though they had different URLs. For example, the base page's URL may have identified only a server or a directory, while the linked page's URL added explicitly the name of the default page for that server or URL. It appears that many pages are linked to themselves, and not just by explicit within-page links (URLs starting with "#"), which were not followed by the program. This situation often seems to arise through the use of a site template that results in inclusion of uniform links to the most important pages on many of the pages.

The distributions of average densities of base description words and phrases in linked pages in the same directory are both trimodal in shape. both show two peaks at the extremes of zero and in the 90-100% area and a third peak more or less toward the low end (in the 30-50% range for words and in the 10-20% range for phrases). These can be seen as tentatively suggesting three main approaches to descriptions of related pages.

1. a unique description of each page, with little or no indication of family relationships;
2. generally a different description for each page, but with repetition of phrasing to reflect page affinities;
3. virtually word-for-word duplication of a single description, separated from the identical description categorisation perhaps only by minor variations in spelling or punctuation

The second approach, that of partial repetition, seems to have a substantial following The design of tools to assist site creators in composing a suitably structured family of page descriptions, rather than just individual descriptions, may therefore be a worthwhile undertaking. As is evident from the first example, partial repetitions do not necessarily follow a particular pattern, but, as the second example makes clear, some page creators are very concerned with adhering to a systematic plan for constructing description families

The tendency for words to be repeated between descriptions more toward the beginning, while significant, is not extremely strong. This slight preference, however, might move designers of systems for the generation of page descriptions toward a general-to-specific arrangement of information rather than the reverse. There are some potential dangers to this approach. For example, it appears that, in many instances, many pages from a site may be submitted to a search service; if the descriptions exceed the maximum length accepted and are accordingly truncated, key information that distinguishes one page from another may be lost.

The third example suggests a slightly different approach to constructing a family of descriptions, somewhat similar to the sort of result one might obtain using structured abstracts. a home page description consisting of multiple parts, each describing a different aspect of the site, and other pages with short descriptions consisting of one or more of these parts depending on the pages' coverage. Again, a problem might arise here if the base description exceeds the maximum allowed by a search service

The final example demonstrates one of the other approaches that may be taken, one in which all pages on the server have the same description unless this has been overridden for a specific page. In this case, the home page for the directory for items on an actor is apparently given its own description, but other pages in that directory retain the default description. This sort of pattern is quite likely to arise from employing templates in a tool such as Dreamweaver, where the template contains a description, but that description may be overridden for individual pages that use the template.

The comparison of linked pages confirms the suggestion derived from the follow-up study of a tendency to switch from sentence-level descriptions for home pages to noun-type descriptions for other pages on a site, though with considerable variation in practice

Future research

It would be useful to undertake a rating of a sample of descriptions for quality, using either objective criteria or subjective human judgements or a combination of the two. Even scholarly abstracts have been found to be often of rather poor quality; for example Pitkin, Branagan and Burmeister [85] demonstrated inconsistencies and other defects in published author abstracts. Inter-rater reliability might, however, be expected to be low; for example in a study in which subjects rated different abstracts of the same document on various criteria, such as conciseness, agreement was sometimes very poor [86]

A very simple kind of assistance that might be made available to web page creators is that already provided in WordPerfect· namely, copying any abstract into the DESCRIPTION META tag when exporting to HTML. Conceivably, the abstract or description might also be copied automatically to the corresponding Dublin Core tag. Dublin Core elements were rarely encountered in this study however and the DC.DESCRIPTION META tag appears to be redundant, especially if it merely duplicates the DESCRIPTION tag.

If more advanced tools are to be produced to assist in the adding of appropriate META tags to HTML documents, it is likely that different tools will suit different types of users. That individuals use quite different approaches in writing abstracts has been noted in studies involving think-aloud protocols [87]; similar observations are to be expected regarding the writing of other kinds of summary For creating web page descriptions specifically, results of the present study suggest that some authors might just want a feature to copy text from elsewhere on the page and others might find automatically generated lists of key words or phrases to be helpful. In addition, as already noted, assistance in creating families of related page descriptions could be of value.

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Web log file analysis: backlinks and queries

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As has been described elsewhere, web log files are a useful source of information about visitor site use, navigation behaviour, and, to some extent, demographics. But log files can also reveal the existence of both web pages and search engine queries that are sources of new visitors This study extracts such information from a single web log file and uses it to illustrate its value, not only to the site owner but also to those interested in investigating the online behaviour of web users.

Introduction

A user visit to a website will often be recorded as a series of lines in the site's log file. Much valuable information can then be extracted from this about site use and user navigation behaviour [1-3], perhaps using one of the many web tools for summarising web log files, such as NetTracker (www.sane.com). An additional important concern for site owners, addressed in some log analyses, is the generation of new traffic Web advertisers, for example, put a precise value on this in terms of click-through charges for online banner adverts. Information about how users found a site would be important for those without the brand visibility of, say, *The Times* newspaper. For this kind of site, then, knowledge of the existence of other pages linking to it and of search engine queries referring visitors is important. The use of links to point to other sites is common and a valid source of study even in the commercial domain because, for example, in the UK external links were carried on 66% of the sites in one survey, where 17% carried links for apparently philanthropic purposes [4].

In the wider social context, the huge web user base makes online activity an important commercial and sociological phenomenon. The study of web surfing behaviour has, however, been very fruitful, particularly in terms of analysing the actions of a user in a single site. Studies of this kind, based upon laboratory experiments or web log analyses, have helped to develop rules for improved site usability. One example of this is the identifie need to minimise the number of click needed to get to any information from th home page [5, 6]. Before a site can be visited however, it must be found, perhaps through search portal. Studies of resource discover through search engines have also been plentiful, covering both evaluations of the tool used and suggestions for improvements [7 11]. It would, however, be useful to know th kind of related analyses that could be performed on site log files, and whether it woul be possible to identify any general patterns c user behaviour. One immediate obstacle t this is that log files represent only snapshot of the actions of a set of users. It is contende here that there is, nevertheless, the potentia for a close analysis of the data to reveal information that is unexpected in the context o navigation between sites and, therefore, t provide novel hypotheses about aspects o online activity. An example of such a conclusion inferred from log data is the discover that many users still struggle to understan the web from the appearance of commo website domain names in the top ten o search query terms for 2000 [12].

Web log studies

Most of the published writings concerning lo file analyses of individual websites hav tended to focus on summary statistics or internal navigation analysis [1-3, 13-15], or on profiling individual users [16] This literature ha developed general guidelines about the pit ılls in log analysis, particularly concerning the are with which results should be interpreted ,sues of internal site organisation problems iscoverable in logs will not be dealt with here ecause these have been comprehensively overed already. There do not, however, ppear to have been any academic articles nalysing individual websites in the context of ow they were found, from multiple search ngines or other sources Many log file analysers do, nevertheless, have the capability to eliver some or all of the necessary summary tatistics, including the SpeedTracer web log nalysis tool described by Wu *et al.* [13], which ives a simple count of backlink pages.

There have also been several published xercises that have analysed the logs of the earch engines directly, including AltaVista nd Excite, with a recent survey article giving n overview of current progress [17] Such sureys are to some extent inter-website in ature, dealing with the requests of users seekng to find another site or information likely to e on another site The surveys have been stastical analyses and have revealed interesting acts, such as average query lengths and the oor take-up of advanced search syntax They ave not, however, attempted to contextualise ie information in terms of the site jumped to, ocussing instead on information retrieval spects of the process There is, therefore, pace for some discussion of this point

he aims and scope of the study

his study takes as its raw data the log files of a ingle website over a period of 10 months, covring 17,552 accesses. It reports on an attempt o extract as much useful information as possile, in terms of both knowledge useful to the ite owner and wider information about web urfing behaviour. This includes an analysis of housands of search engine queries that esulted in visits and the discovery of pages ith links to the site. The first aim is to use a ase study to illustrate the kind of information btainable from the logs of a website about ow visitors found it. The second aim is to iew the data as a snapshot of user web behaiour and to attempt to use it to identify unuual behaviour on the interface between vebsites, which would merit further research.

Methodology

Identifying link source pages

The website chosen for the study was the University of Wolverhampton Computer Based Assessment project (cba.scit wlv ac uk). This is quite a small site, with only five pages, but one that generates 20,000 page hits per year. It gives information about the project and allows full working programs to be downloaded for free. Its log file could, in theory, contain any information known to the computer system that the web server is operating from, in addition to information sent by the user in the form of web page requests. For this study the logs contained the text of the request, plus the date and time for each entry Log information was only kept for web pages and not for the individual graphical elements of the site. Web pages are requested using the HyperText Transfer Protocol (HTTP) and the request must specify, as a minimum, the identifier of the resource sought, normally the portion of the URL after the domain name [18] Packaged together with the request (although part of a different protocol) must also be details of where to send the page, the Internet Protocol address of the source computer. If this were all the information obtainable then log file analysis would be mainly restricted to site navigation efficacy discussions Normally, however, additional facts are conveyed with the HTTP header of the request, including the name of the browser or other software package used (HTTP_USER_AGENT) and the domain name of the requesting computer (REMOTE_HOST) One particularly interesting field in the request header is HTTP_REFERER. This, if implemented, can contain the URL of the page from which the current one was accessed The existence of web pages elsewhere that contain a link to a logged page can be discovered through this information

Extracting the search engine queries

One type of referrer is especially interesting: a results page from a search engine. This would normally contain an encoded form of the original query submitted by the user. It is particularly useful to give an insight into both the information need that lead the user to the site, and the fact that the search engine's algorithms indicate the site or page as potentially fulfilling that need.

When a web page contains a text box or other HTML form elements and the contents are submitted, they become transformed with a simple encoding and sent to a program residing on a web server, either as part of an URL or separately from that URL [19]. The actual coding of query text in URLs is standard, inherited from their origin in HTML forms, which have a defined procedure for encoding in URLs. Essentially, alphanumeric components of the query copy directly to the URL, but many others change, including spaces to %2E and quotes to %2F. Most search engines use the URL encoding method and so, for example, it is possible to recover queries from the URLs of search engine results pages. There are, in practice, two ways of extracting the query from an URL. The first, available to anyone without the need for specialist software or knowledge, is to copy it to a browser and view the page returned. This may well not contain the same set of links as the original query response, but, unless the search engine no longer supports the form of coding used in the URL, the page should contain somewhere a copy of the original query The alternative method, used in the survey, is to interpret the URL coding sufficiently to be able to extract the query from it without requesting the page. The factor that is not common to all search engines, however, is the identifier used to distinguish the query text from the other URL-encoded data These, therefore, had to be manually identified and encapsulated in a program written to extract the query syntax. This variable component, combined with the continual increase in the number of search engines, would quickly render obsolescent any existing web log file analysis programs that attempted to extract search queries. The use of a specially written timely log analysis program was, therefore, essential for a fully comprehensive academic analysis, although the keyword analysis facilities of a standard web log analysis program would be sufficient for normal purposes.

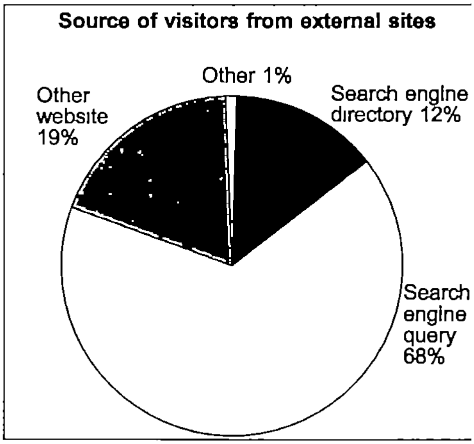
A complication arises when more than one input of information is used to construct a search. Two examples of this are· a searc within a search engine directory catego and an initial search that has been followe by the selection of meta-terms to refine Particular care had to be taken to ensure th any extra data of this sort was not lost whe programming the extraction of queries.

Results and discussion

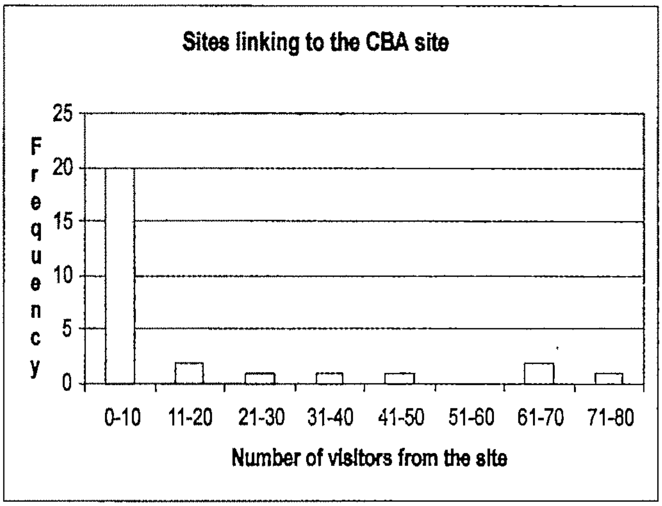
Sources of page visits

The log file was processed in order to extra the names of all HTTP referrers. This par meter was present and meaningful in 11,0 out of the 17,552 logged requests. Most of th requests, 3642, were from search engine Figure 1 shows a breakdown of the 4548 ident fiable sources of page visits from extern sources, having excluded pages in the CB site. The 38 visits recorded in the 'Other' cat gory were page requests from translation se vices, links from bookmarks and 12 visits fro a search engine's random jump feature Th figure shows the importance for this site search engines. It should be pointed out th Yahoo! searches its directory structure fir when a query is entered, only searching ou side if no matches are found, and so many the query matches will have been made on because the website was present in th Yahoo!Directory.

Figure 1 *A breakdown of identifiable sources of visito to the site (from pages outside the host institution) recorded in the HTTP.REFERER header field of the w request*



jure 2. *The distribution of external sites in terms of the number of visitors directed to the CBA site*



ges linking to the site

l search engine request pages and commer- al search engine directory pages were fil- red out of the list in order to identify other k pages. Of the remainder, 44% came from e university hosting the site. These were so removed, leaving 44 different pages, counting for 386 site visits in total This list useful as a positive indicator of pages that th link to the site and generate traffic to it e list is not exhaustive, because of the uni- ntified links.The counts are also not reliable cause cache services could also reduce e counts for a page, as visitors after the first rough the cache would not register in the e log until the cache flushed the page or quested it again to refresh its archive

These figures represent, then, the mini- um number of site accesses from each urce. One important proviso is that the TTP_REFERER is a parameter that is capable containing inaccurate information, as the ogrammer of an unruly browser or crawler uld fill it with any text To counter this, ch page was visited and checked for accu- cy. This stage revealed a number of web ges not containing links to the test site. ree were home pages of websites offering egal software for free One more was discovered to be a search engine, which was previously unknown and did not carry the giveaway URL-encoded data. A page that stood out as an unusual source of links, and appeared six times during April and May 2000 with six different identified users, was the home page of the International Atomic Energy Agency, a page that, at the time of checking, did not contain a link to the site. Based upon the six different visitors from the same source, it was assumed that it was likely that a link existed at that time. All of the remaining pages either contained a link or were unobtainable but from their URL seemed likely to contain a link. The final check was of the user agent associated with each visit, which revealed that one of the pages was from a crawler-compiled directory and all of the hits had come from the crawler This page was discarded.

The cleaned data revealed that a few educational sites were major sources of traffic and a large number of sites or pages generated just a few visits, as shown in Figure 2.

Comparison of log file analysis with search engine backlink reports

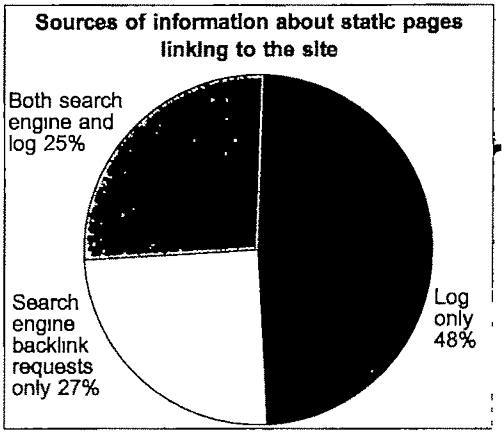
A number of search engines offer the facility to report all of the web pages that link to a given web page or website. An analysis of the top 16 search engines, as reported by Media Metrix [20] based on a user survey, revealed five offering this facility A second list of link pages was compiled, this one from combining results from all these search engines. AltaVista, Google, NBCi, HotBot and Go/Infoseek For engines that counted links to individual web pages, these were tested for all valid URLs to the five pages in the assessment site, which totalled 14 in all, but almost all links were to the default root domain name of the site only. This list, once search engine directory pages had been removed, was compared with the previous one. The extent of the difference between the two lists was remarkable, as shown in Figure 3. Three of the biggest sources of new visitors were not indexed in any search engine, in both cases because the HTML design effectively hid the link from the search engine. The lack of indexing is interesting because if pages are not indexed in search engines then they must get visitors from other sources. Two of the sites were major educational initiatives, accounting for their use, and one was an academic course page, with the URL presumably communicated to students by their lecturer. No explanation is needed for little-used link pages not being indexed in search engines since they are known to index only a proportion of the Web. The existence of pages apparently not generating traffic is also a salutary reminder that being linked to does not guarantee visits In summary, the combination of two sources provided a more complete picture of the number of pages linking to the site than either offered individually.

All of the pages checked were education related sites linking to the site in order to provide a resource to support education, either targeting those wishing to use the programs or those wishing to see a case study of a computer based assessment project. These two reasons for linking were unsurprising, but it is interesting to note the voyeuristic nature of the latter.

Search engine queries

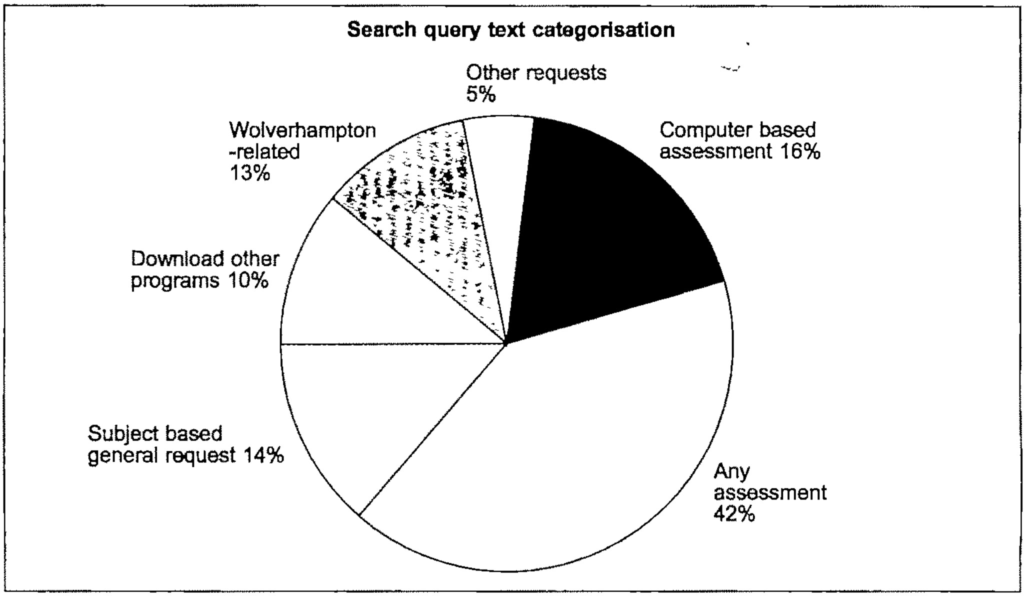
As described above, the vast majority of identifiable visitors to the site came from commercial search engines, including their directory Of these, 56% came from Yahoo!, 11% from Excite 8% from AltaVista, 6% from Google and the remaining 22 engines each accounted for 3% or below. Yahoo!'s dominance is a reflection both of its user base, the largest of any search engine during the survey period, and the fact that the site is included in Yahoo! Directory categories, and hence enjoys a relatively privileged position in this search engine.

Figure 3 *A summary of the proportions of pages found from either and both of the main sources*



Of wider interest, however, is an analysis of the query text used in each engine from which a search results page contained a link to the site. These were extracted, grouped and then classified into the nature of the information request, as shown in Figure 3. The graph shows that only 16% specifically requested computer based assessment. The largest group requested assessment by using this word or a synonym such as 'test', but did not specify that it had to be computer based or online. Of course, in some or all of these requests the user may have actually been seeking online resources and may have assumed that this is what they were likely to find since they were searching on the Internet. A small number of searches did not mention assessment, but did include subject-specific details that would allow them to be classified as mathematical, statistical or computing requests The remainder of the identifiable requests were for purposes outside the objective of the site A surprising number of visitors searched

Figure 4 *Query text categorisation across all recorded search engine results pages*



for Wolverhampton, Wolverhampton University, or some other general request that included the city name. Ten per cent also searched for downloadable programs· half for specific programs not available on the site and half for any programs. A small number also used the advanced image search of a search engine to find pictures of a PC or a glider

Conclusion

This study covers only one website and, therefore, its findings do not necessarily generalise to the whole web The backlink analysis does, however, suggest several points.

- Search engine backlink counts can be far from exhaustive.
- Many links to a site may generate little or no traffic
- A combination of search engine backlink discovery facilities and web log analysis is likely to yield a fuller picture of the link structure surrounding a site than either taken on their own.

The existence of unused links is an interesting phenomenon in itself because it is likely to be invisible to the link page owner and not recorded in their logs if the target is an external page. In order to record such information in the log, special programs would have to be connected to the page especially for this purpose Such is the case, for example, in many search engines, where links to sites are sent via a redirection program, but is believed to be relatively rare on other sites

The breakdown of search engine queries resulting in new visitors is useful to the owner to identify the search databases that index the site, the keywords perceived as matching its content, and the resulting traffic level This last indicator would be useful to monitor over time. with falling referrer counts possibly indicating a fall in rank [8] Of wider interest is the evidence of flexibility of surfing behaviour from those using a search query and choosing to visit the site Only 16% included terms unambiguously indicating the need for computer based assessment, although a further 56% expressed a requirement for general assessment or related subject-based information. A fundamental methodological problem here is that it is impossible to infer the precise need which lead to the query formulation For example, those searching for 'maths assessment' may have assumed that the results would be mainly restricted to online tests by virtue of the interrogation medium. Subject to this proviso, however, the queries chosen by visitors were suggestive of at least a flexibility in information needs and perhaps also the ability to be easily distracted from the chosen goal, as evidenced by the 13% who searched for an aspect of Wolverhampton. Clear evidence of parasitic behaviour is also shown in the number of visitors who were looking to download any programs and those simply looking for a general picture on the site

Web log files, then, can provide useful information to site owners about sources of new visitors They have also the potential to be a source of evidence to researchers interested in user interaction with search engines as well as more general web surfing behaviour

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Management of information technology in academic information services

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The dependency of academic information services on information technology is growing, particularly as information technology is the primary infrastructure of a digital library. This is compounded by the fast changing/developing nature of information technology and the trend towards digitization. The changing nature of information technology contributes to the need to manage it The focus of this article is on the management of information technology with specific reference to the changing nature of this resource. To find a suitable model with which to manage information technology the management of change as well the management of technology was studied. In doing so 11 variables (which should be included in a management model) were distilled from the literature. Directors of academic information services in the South African tertiary sector were approached to rank the variables. Of these 11 variables, the first six were identified as key criteria. When existing information technology models were evaluated, these key criteria were used as the most important measures of effectiveness. However, attempts to find a suitable existing model that accommodates all six key criteria were unsuccessful Ultimately, a new model was designed which could be implemented by academic information services (i e. university libraries).

Introduction

The arena in which information professionals find themselves is a dynamic one, one that is not only a driving force behind change but in itself also prone to change This is motivated firstly by the fast pace at which the tools (information technology) used in this industry are changing, secondly by the fact that the produce (information) this sector is concerned with is in itself a major change agent; and, thirdly, because the academic library, as it is known in the traditional sense, is in the midst of a major change from a traditional paper base to a digital, virtual information service. In this article the concept 'academic information service' will be used and not 'academic library'.

It seems therefore essential that a management protocol or model is needed by which information technology can be effectively managed. As information technology is a changing resource, being used in a changing environment, it seems logical that the process of change management could make a useful contribution towards developing/finding such a model. Another source could be the management of technology in general

The aim of this article is to examine the management of information technology, as a changing resource, in academic information services in South Africa and to identify or design an appropriate model by means of which information technology in academic information services can be managed successfully.

Examination of change management models

Change is an inescapable phenomenon. Change has to be faced in all arenas of life – personal, organisational, technological and others. Change has many aspects to it and is difficult to categorise because of its multifaceted nature. Change impacts heavily on human resources and leaders play a pivotal role in the process. Technological change is not only a change lever, but also a subject of increasing change, change that increases in speed and intensity.

The following change models were studied to identify design considerations that could be adopted to serve as criteria with which models for the management of information technology could be evaluated:

- force field analysis [1, p 13],
- configurational learning [1, p 17];
- gap analysis [1, p. 19];
- innovative change [2];
- leadership intervention [3];
- naca (notice, attitude, choice, action) cycle [1, p. 25];
- systems theory [4, p. 7],
- pendulum theory [1, p. 29];
- business process re-engineering [5, p. 19];
- grief cycle [6, p. 19];
- oracle organisational change management model [7, p. 90];
- T R Y. (Test Re-Calibrate Yes) change model [8, p 28]

After studying the models, the following design parameters were identified:

1. External environment impacting on technology development needs to be taken into account
2. Forces driving technological change as well as forces opposing technological change should be taken into account.
3. Both planned change and emergent change should be accommodated.
4. The observation that information technology impacts on all levels of an enterprise should be recognised.
5. The vision of what the result of the change will be must be clear.
6. Planned change in an enterprise seeks to establish a higher state of effectiveness and efficiency.
7. Inevitable technological changes should be recognised in advance.
8. The gap analysis should be incorporated into the model. (In the gap analysis model change is seen as converting the way things are to the way things are desired to be The distance between the status quo and the desired state is the 'gap')
9. The relevance of systems theory in the information technology environment should be recognised. (Systems theory recognises the importance of studying the interrelatedness of planning, organising, and controlling in an enterprise and that of the enterprise's many subsystems, such as delegation, network planning and budgeting.)
10. Risk assessment should be part of the model.
11. The grief cycle or some means of accommodating the human element into the model should be considered. (Change creates a feeling of loss, as people are required to give up old behaviour and patterns to adopt new ones)
12. An evaluation component should be incorporated into the model.

Examination of information technology management models

Technology has become a key change lever of this century and as such it makes sense that technology requires systematic management to allow enterprises to keep abreast of developments and to ensure their competitiveness.

To ensure that the management of information technology in the enterprise is a success, the following factors, identified by Osterle, Brenner and Hilberts [9] and Magal and Strouble [10, p 24], are of particular importance

- costs (of acquiring the technology as well as the cost of ownership);
- optimal use of the technology;
- speed (of service);

- quality (of service and products);
- competent staff;
- user training;
- top management support.

The literature search for models on information technology produced ten models (it should be noted that none of these were applied in an academic information service setting):

- application planning model [11];
- technology acceptance model [12, p. 185];
- computer self-efficacy model [13, p 25];
- information technology management model [14],
- model for change [15];
- multidimensional model of information resource management [16, p. 6],
- implementation success model [17, p 12];
- consistency model of information technology management [18, p 45],
- generic change model for information systems [19, p. 68];
- DeLone and McLean's model of information systems success [20, p. 6].

After studying the models, the following aspects were identified as design considerations.

1. Technological change as an accelerating process Hulser [21, p. 25] is of the opinion that major technology changes now occur approximately every 18 months The short product life cycle as experienced in the information technology arena is considered to be included in a model to manage information technology
2. Man, or the human aspect with reference to his influence on and use of technology.
3. The merging of traditionally distinct markets as a result of technological integration. The merging of different markets necessitates a closer look at the external environment in order to identify possible threats of being absorbed in other markets. Similarly the opportunities to be derived from well-matched mergers should be considered
4. The role of the end-user in the utilisation of information technology
5. Integration of information technology with other technologies
6. The characteristic of dynamic (almost spontaneous) growth/improvement that technology displays.
7. The abandonment/succession of the technology should be planned
8. Information technology architecture and standards.
9. Centralised management responsibility should be incorporated into the model.
10. The necessary funding as a critical success factor
11. Cost-effectiveness analysis
12. The upgrade programme to be executed or some means of technological forecasting
13. Anticipated needs/needs driven/market analysis
14. The integration of the information technology management plan with the strategic management plan of the enterprise.
15. An analysis of the impact of the technology.
16. Cognisance of the external and internal environment (impact analysis). Cross-impact analysis is a set of methodologies designed to forecast an interrelated group of events.
17. A scan of the technological environment of the enterprise.
18. Specific procurement processes should be adhered to.
19. There should be an evaluation after new technology has been implemented.
20. Range and reach of the infrastructure of the enterprise.
21. The enterprise and information technology competencies available should be considered.
22. Risk assessment
23. Technology portfolio analysis. A portfolio is a group of technologies that together forms a balanced technology system Technology portfolios should contain a technology inventory. The inventory should state the age, repair history, costs, usage rate, depreciation schedule, capacity, expected replacement time and general condition of each item on the system.
24. The structure of the enterprise. The structure of an enterprise is the logical relationships of management levels and functional departments arranged in such a way as to permit the effective attainment of aims and objectives

Development of variables for the evaluation/design of information technology models

The design considerations identified when studying the change management models (12 design considerations) and information technology management models (24 design considerations) were ultimately incorporated into 11 variables to develop an information technology management model suitable for academic information services.

1. Environmental scanning

Environmental scanning should identify the pace at which relevant technologies are changing. The importance of this aspect is enhanced by Hollis [22], who is of the opinion that enterprises are endangering themselves through failing to recognise that the accelerating rate of information technology change is a discontinuity that will create winners and losers. Arnold [23, p 2] views acceptance of information technology and the scanning of this environment as a core competency of the information professional The model should have an aspect of environmental scanning/analyses for it is imperative, according to Cohen [24], that players within a rapidly changing industry conduct environmental analyses. This should be done for two reasons: it allows for anticipation of developments and for the identification of threats The indication, therefore, is that the process of environmental scanning in this sense is similar to the process that is performed when doing strategic planning.

2. Available resources in the enterprise

Both Nath [25, p. 443] and Cotton [26] are of the opinion that the management resources, especially as far as finance and staff levels are concerned, must be considered in the management of technology. Without the necessary funding the application of information technology is impossible. Equally important is knowledge of the information technology infrastructure available in the enterprise because putting new technologies into operation often requires sophisticated and expensive infrastructure Supporting these technologies also requires that expertise should be available within the enterprise or that, alternatively, the funds are available so that the support can be out-sourced

3. Centralised management responsibility

In both the management of change and the management of information technology, specifically the model of Best and May [27, p.3], the role of the leader/manager is emphasised It is argued that the vision of what role information technology should play in the enterprise, the establishment of standards and a common architecture will hardly be possible without the management of the information technology being centralised. This, however, does not imply that the information technology manager be an autocrat, but rather that mechanisms be put into place to ensure that commonality concerning the management of information technology between the various constituencies of the enterprise be reached.

4. Technological forecasting

Technological forecasting should be a routine part of strategic technology planning to enable an enterprise to maintain a proactive vision of its future technological capabilities [28, p. 623] Forecasting has some commonality with environmental scanning and with the creation of a vision of what the information technology of the enterprise should look like. The connection with environmental scanning is especially of significance when trend extrapolation is used as a forecasting technique. The creation of an information technology vision for the enterprise is dependant on forecasting to some extent because visioning is easier if it is known what is possible/feasible and what is not. However, forecasting does not fit under the umbrella of either It is therefore identified as a variable by itself

5. Information technology standards and architecture

Standards and architecture of information technology that are agreed upon are important, especially to ensure integration of various technologies [29, p 52]. The function of these standards is to prevent deviation from a set course of development which will fulfil the agreed upon vision. Adherence to standards will also result in what Feld and Jones [30, p 4] describe as a narrow technological footprint, which is limiting the number of different hardware and software configurations in the enterprise.

6. *Evaluation of the information technology*

That there should be some evaluation is clear from both change management as well as the management of information technology. The evaluation aspect relates to several variables The agreed upon standards and architecture can, for example, be used as a measurement by means of which the current situation can be evaluated. The vision of the role of information technology in the enterprise can be used in a similar manner However, the role of the vision in the management of information technology is of such importance that it warrants a position as an independent variable

7. *Risk assessment*

An enterprise faces a number of information technology related risks [31, p. 6].

- integrity risk (related to incomplete, inaccurate and unauthorised data),
- availability risk (caused by disruptions to systems);
- security risk (the leaking of confidential information);
- infrastructural risks (owing to lack of effective infrastructure such as hardware, software and networks).

8. *Market analysis*

Clients or end-users have the power to determine the success or failure of an enterprise and analysing them will enable management to identify changing needs in time [32]. This is supported by Nath [25, p 440], who is of the opinion that responsiveness to users provides management with better business understanding. Where academic information services are in the service industry, it is essential that users and their needs not only be considered but also anticipated.

9. *Vision of the role of information technology in the enterprise*

The vision of what the information technology of the enterprise must look like is the measure against which the current situation is evaluated when performing a gap analysis This aspect is also related to the variables of standards and architecture, environmental scanning and technological forecasting. The setting of standards and architecture may be (at least in part) the result of what has been envisioned, so will be the plans of how the current technology will be abandoned and what will be the technology to succeed it On the other hand, the vision will be influenced by what has been learned through the environmental scanning and technological forecasting. That being the case, the vision is of such importance to ensure development of the information technology environment of the enterprise that it has to be formulated as a variable in its own right.

10. *Integration of the information technology – and strategic plans of the enterprise*

Henderson and Venkatraman [33, p. 4] argue that an enterprise's inability to realise value from its information technology investment is in part due to a lack of alignment between the business and information technology strategies It is furthermore argued that no single information technology application can deliver sustained competitive advantage. Sustained competitive advantage rather is obtained through the capability of the enterprise to exploit information technology on a continuous basis, which means that the information technology and strategic plans of the enterprise must be integrated.

11. *Human aspect with reference to mankind's influence on and use of information technology*

When confronted with new technology, employees often display behaviour as described in the grief cycle model [6, p. 19]: denial – choosing to believe that nothing is happening; anger – often accompanied by depression and a feeling of hopelessness and helplessness, acceptance – an awareness that the situation is not going to go away and needs to be dealt with. Information technology suppliers, staff, managers and users should be approached with emphasis on the human aspect of using information technology rather that the technical aspect thereof [34].

Ranking of the variables

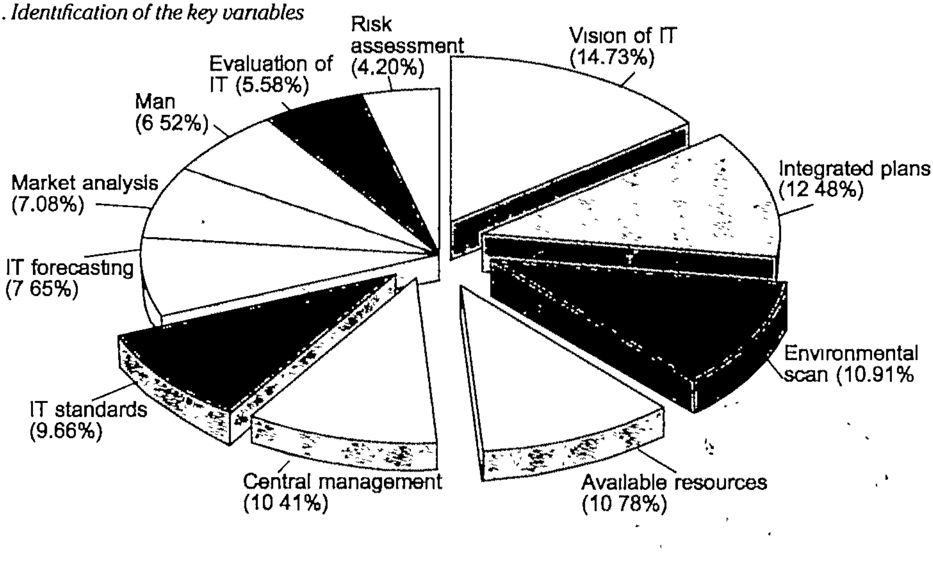
A list of the above mentioned variables (with accompanying explanatory notes on each variable), was sent by electronic mail to the directors of all the academic information services of tertiary institutions in South Africa (22 universities and 15 technikons). The respondents were requested to rank the criteria in order of priority and to make use of the accompanying notes to the variables. The ranking of the variables was calculated to produce a list that will reflect what variable the respondents deemed more important than the other variables. The results of the ranking exercise have the variables arranged in the following order of importance:

1. vision of the role of information technology in the enterprise;
2. integrated strategic information technology and business plan of the enterprise,
3. environmental scanning;
4. available resources in the enterprise;
5. centralised management responsibility;
6. information technology standards an architecture;
7. technological forecasting;
8. market analysis;
9. human aspect with reference to mankind' influence on and use of information technology;
10. evaluation of the information technology;
11. risk assessment.

A sound modelling principle with regard t the number of variables is to keep it as smal as possible and to identify the key variables This is supported by Jenkins [35] who advise the modeller to aim for parsimony in parame terization and to avoid over parameterizatio From Figure 1 it is clear that the respondent ranked six variables significantly higher tha the other variables:

- vision of the role of information technolog in the enterprise (14.73%);
- integrated strategic information technolog and business plans of the enterpris (12.48%);
- environmental scanning (10.91%);
- available resources in the enterpris (10.78%);
- centralised management responsibilit (10 41%);
- information technology standards and a chitecture (9 66%).

Figure 1. *Identification of the key variables*



These six variables were identified as the key variables that should be included when developing a model to manage information technology. Directors of academic information services did not regard the human factor as a key variable, although the literature emphasised that information technology is useless, except when operated by humans. Wilson [36] states that technology is merely a tool and not even the most important tool, an honour that belongs to the human brain. Therefore, it seems quite strange that directors of academic nformation services in South Africa did not regard mankind's influence on the use of information technology as a key variable

Evaluation of existing models and development of a new model

n applying the variables, as ranked by the heads of academic information services on existing models in an evaluation exercise, emphasis was placed on the presence of the key variables. Nevertheless, having all the variables present was no guarantee that the model would be a useable one. Therefore, the second requirement was that the model should portray the management of information echnology as a process in a meaningful way. A third requirement was that the identified relaionships between the key variables must be evident from the model. Rowley [37] identifies hree main types of relationships:

- *Financial relationship*: an example is profit or loss equals income less expense, or the more employees the enterprise has the bigger will be the labour cost.
- *Physical relationship*· this relationship usually expresses physical limitations such as the number of students a classroom can accommodate, or the stricter the admission requirements for a course the fewer students will qualify for admission
- *Judgemental relationship*: this is a relationship that reflects the judgement or decisions of management, for example the relationship between the user population of an academic information service and the ratio between traditional and digital information sources

The process of evaluating the ten identified information technology models consisted primarily of determining the number of variables each model complied with and turned up one model complying with four of the six key variables (the Consistence Model developed byTan [18, p 45].

Designing a new model

It was clear that the Consistency Model of information technology management [18, p 45] was the model that had the most potential to be developed into an acceptable model. This model regards the enterprise as an open system with a limited number of subsystems To achieve stability the subsystems have to be in harmony with each other, which is achieved through mutual adaptation and adjustment.

The subsystems are to be found in three domains·

- domain of the environment;
- organisational domain,
- information technology domain

The subsystems within the information technology domain, as indicated in Figure 2, influence one another. Within the various domains and subsystems, the following identified variables are present:

- Integrated strategic information technology and business plans of the enterprise.
- Environmental scanning is not present as a variable as such, but the influence of the environment is well illustrated.
- Available resources in the enterprise are also not mentioned but some of the main elements of this variable, such as human resources and information technology infrastructure, are present
- Centralised management responsibility is present by implication (the model places the information technology management function centrally)
- Market analysis is also present by implication through the 'users' element within the information technology domain

It was clear that this model was the model that had the most potential to be developed into an acceptable model. As far as compliance with the variables is concerned, it accommodated five of the eleven variables, of which four were key variables. When the missing variables were added and the unnecessary elements removed it could be represented as in

Figure 2. *Consistency model of information technology management [18 p. 45]*

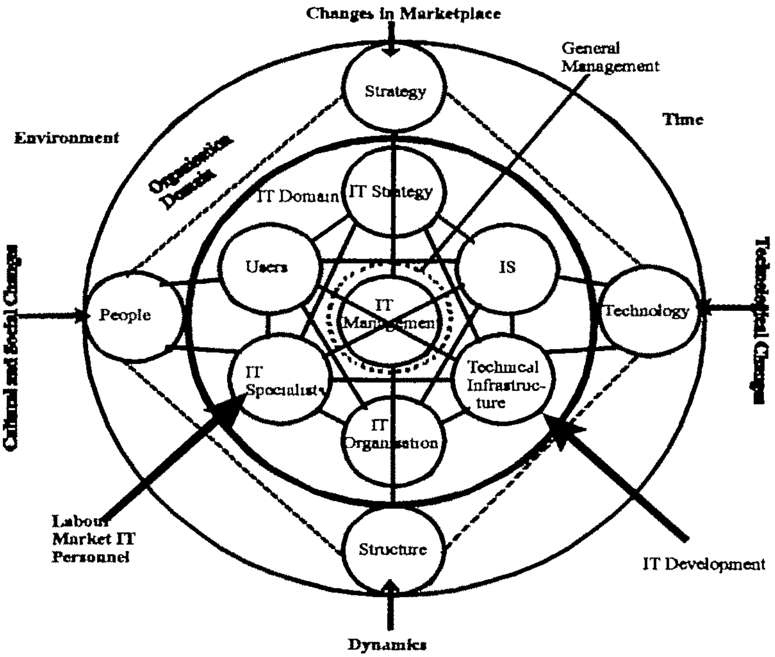


Figure 3 *Adapted consistency model of information technology management*

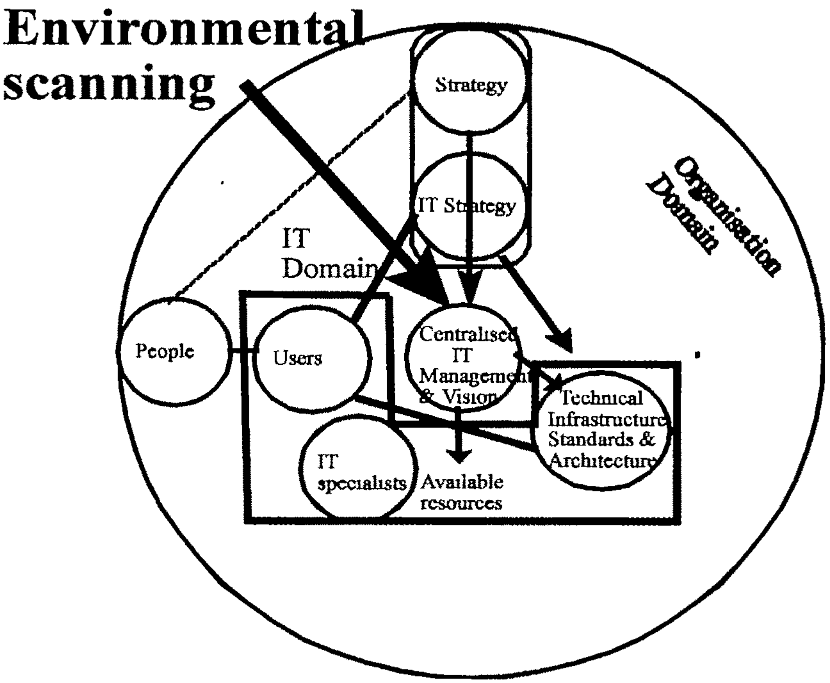


Figure 3 However, it was found that in removing the superfluous elements the coherence of the model was lost. Another problem was that in adding the missing variables, such as available resources in the enterprise, a grouping of existing elements (technical infrastructure, IT specialists and users) had to be made. The effect was that the variable (available resources in the enterprise) was left impoverished because this variable also included financial resources.

Notwithstanding this relatively high compliance with the identified variables, the original, as well as the adopted model, did not answer to the second requirement that the model should portray the management of information technology as a process in a meaningful way.

It seemed inappropriate to discard a model that technically answered all the requirements, but a model may be judged by users on grounds other than its content [38] Users are more likely to use a model if they perceive it to be useful in their jobs and easy to use They are unlikely to use it when

- it is difficult to understand;
- is hard to change (to fit their circumstances);
- it does not look as they expected;
- the user does not believe it fits the problem;
- they suspect it may lead to poorer decisions;
- the model has not been tested enough.

The researchers are of the opinion that the first three instances apply to this adapted model. Subsequently the development of a new model was embarked upon. The result was a model that not only accommodated the six key variables but also satisfied the requirements of an acceptable model. In deciding to develop a new model taking a fresh look at modelling in operations research was necessary. A model in operations research usually takes the form of equations. Although it is not the purpose to build a mathematical model, the following simple equation does provide some insight into the use of models.

The equation is of significance because all models have this underlying structure [39].

$U=f(X_i Y_j)$

Where

U = the utility or value of the system's performance
X_i = the controllable variables
Y_j = the uncontrollable variables
f = the relationship between U and X_i and Y_j

The value that this equation has for the effort of trying to develop a new model is that it underscores the importance of the value/result or product of the model Up to this point all the attention has been focused on the variables. The narrow focus on the variables had the result that the aim or value (U) of the model was lost. It is argued that, in the light of the equation above, the value that a successful model for the management of information technology should confer to the enterprise is: effective information technology contributing to the competitive advantage of the enterprise.

This insight made a significant improvement to the new model, changing it from a model concerned only with information technology, as illustrated in Figure 4, to a model putting the management of information technology in the context of its contribution to the enterprise, as illustrated in Figure 5. Although the human element is not used as a variable, it is implicitly included in some of the other variables: for example, the vision of the role of information technology in the enterprise cannot conceivably be formulated without taking into account the users, for non-acceptance will lead discretionary users to seek alternatives, and cause even dedicated users to manifest dissatisfaction and perform inefficiently, negating many, if not all, of the presumed benefits of the new technology [40] Other variables, such as the enterprise's integrated information technology and strategic plans and centralised management's responsibility also involve user-oriented considerations.

Relationships between the key variables

The model, as displayed in Figures 4 and 5, contains only the six key variables and the relationships between them. This representation is in agreement with the principle of modelling that advocates avoidance of over parameterization.

Figure 4 *Model with key variables without value (U) component*

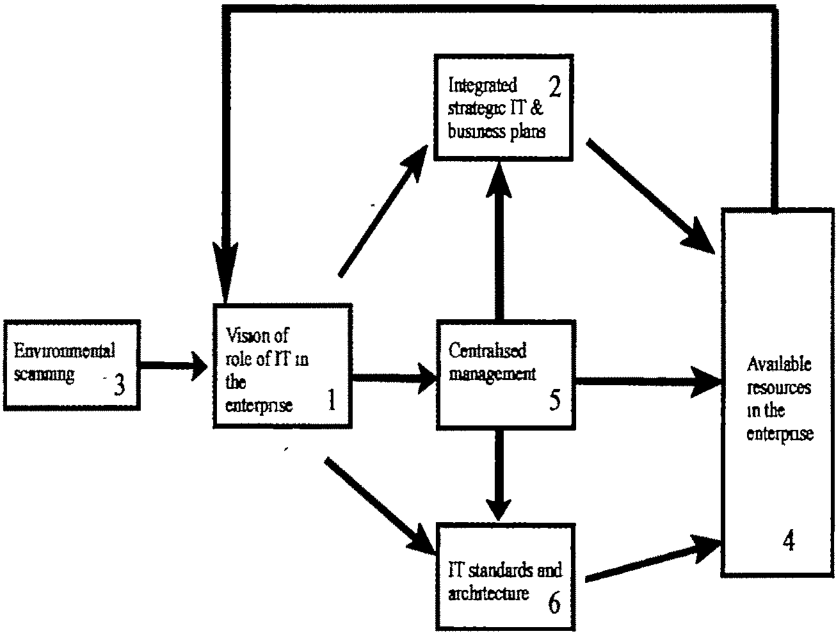
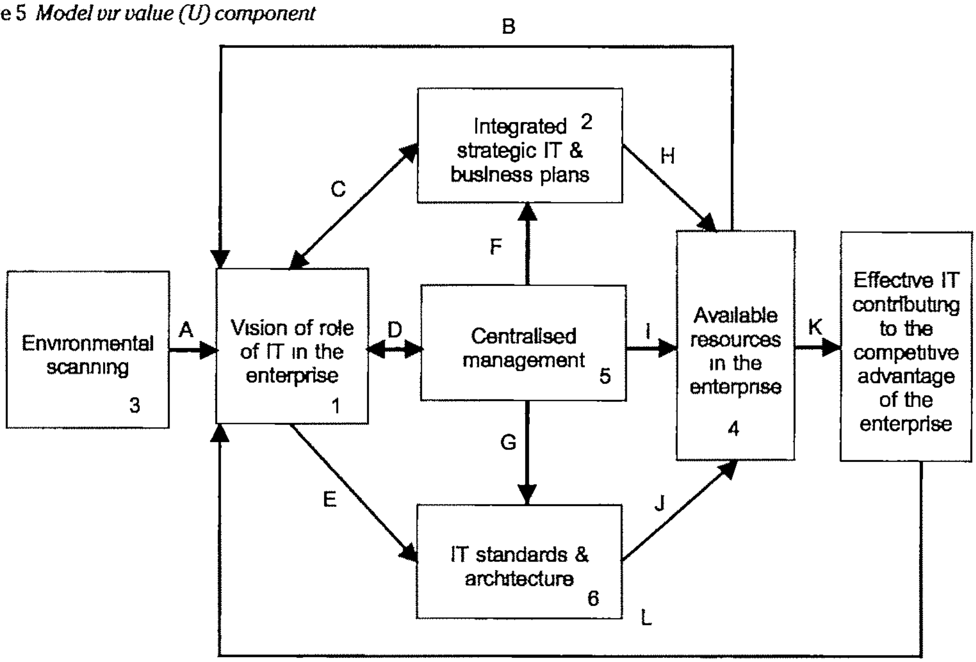

Integrated strategic IT & business plans 2
Environmental scanning 3
Vision of role of IT in the enterprise 1
Centralised management 5
Available resources in the enterprise 4
IT standards and architecture 6

Figure 5 *Model vir value (U) component*


B
Integrated strategic IT & business plans 2
C
H
F
Environmental scanning 3
A
Vision of role of IT in the enterprise 1
D
Centralised management 5
I
Available resources in the enterprise 4
K
Effective IT contributing to the competitive advantage of the enterprise
G
E
J
IT standards & architecture 6
L

The relationships between the six key variables, numbered in Figure 5, are explained as follows:

A Environmental scanning and the vision of the role of information technology in the enterprise. In this relationship, management has to judge whether the latest available information technology developments warrant any change in the vision it has for the role of information technology in the enterprise

B Available resources in the enterprise and vision of the role of information technology in the enterprise. The availability of human and financial resources in the enterprise will effect the manager's vision of the role of information technology in the enterprise. the more he/she believes that he/she will be able to obtain the necessary resources (money), the more challenging will his/her vision be.

C The vision of the role of information technology in the enterprise and integrated information technology and strategic business plans. The business plan may be technology driven or the information technology plan may be driven by the business plan. The focus will be determined by the vision

D The vision of the role of information technology in the enterprise and centralised management responsibility The vision is the primary responsibility of the leader in whom the management responsibility rests.

E The vision of the role of information technology in the enterprise and information technology standards and architecture. The information technology standards and architecture should be included and determined by the vision of the role of information technology in the enterprise

F Centralised management responsibility and integrated information technology and strategic business plans. From these two variables it is evident that the strategic information technology plan will, at least in part, originate from the information technology leader/manager and that this plan will of necessity have a significant impact on the strategic business plan of the enterprise.

G Centralised management responsibility and information technology standards and architecture. When the standards and architecture have been decided upon, the responsibility for applying them rests with the centralised management responsibility.

H Integrated information technology and strategic business plans and available resources within the enterprise in as much as the existing physical hardware and software are a part of the available resources. This relationship shows that the available information technology resources will be increased/adapted to suit the business goals. This relationship is physical in the sense that it leads to equipment being deployed and financial because of the monetary implication of doing so

I Centralised management responsibility and the available resources of the enterprise. Control over existing information technology infrastructure must be exercised centrally to ensure, for example, adherence to standards.

J Information technology architecture and standards and available resources in the enterprise These imply that if standards/architecture is changed within the enterprise the necessary expertise will have to be bought, and also that should current hardware and software not comply to the set standards, they will have to be physically replaced or upgraded (indicating that there is also a physical relationship), putting pressure on the financial resources of the enterprise.

K The available resources in the enterprise and effective information technology contributing to the competitive advantage of the enterprise. This is the ultimate relationship in the sense that if the information technology is managed in the correct way, it will result in the enterprise being more competitive

L Effective information technology contributing to the competitive advantage of the enterprise and the vision of the role of information technology in the enterprise. The (positive or negative) effect of the contribution of information technology on the competitive advantage of the enterprise will either stimulate or inhibit the vision of the role of information technology in the enterprise

All the relationships are judgemental ones, except for I, which represents both physical and financial relationships, and B, which represents a financial relationship

This model has been exposed to two focus groups where a selected number of senior staff members from academic information services were asked to criticise the model. The discussions were a disappointment in the sense that no contribution to improve the model was made by either group It was comforting in the sense that the focus groups were in agreement that the model provides a logical framework for the management of information technology. Generally speaking, the model was well received, though some criticism was expressed about the human aspect not receiving enough prominence During one of the focus group discussions it was remarked that, although the roots of this model are in the education sector in South Africa, it seems that it could be universally applied as a model for the management of information technology irrespective of economic sector or country This is seen as an unexpected benefit

Guidelines for implementing the new model

Although the implementation of the model was not part of this investigation some guidelines are provided on how the model can be implemented:

- A principle of managing change is that leadership should be from the top It is therefore recommended that top management empowers the information technology manager with decision making powers and a clear mandate to manage the information technology of the enterprise centrally.
- A clear vision of the role of information technology in the enterprise should be established In doing so, the information technology manager must activate those elements of the model that will enable him/her to build a vision of the role of information technology that will result in a more effective and efficient enterprise
- The strategic business plans of the enterprise and the information technology plans should be integrated. At this stage the risks inherent to executing (or not executing) the plans should also be determined.
- Information technology standards should be set and the architecture be determined The standards and architecture will be the result of that which is envisaged, the market desires/needs and what the information technology manager deems to be appropriate
- The last step should be the evaluation of the model. The evaluation process reflects on two aspects. Firstly, the available resources in the enterprise are evaluated in terms of the previously set standards and architecture, with corrective measures applied as necessary. The second aspect of the evaluation process is determining whether the vision of the role of information technology in the enterprise, as well as all the other aspects of the information technology process, did indeed result in effective information technology contributing to the competitive advantage of the enterprise.

These guidelines are not set in stone. The information technology manager would do well to take cognizance of the management of change and the management of technology. Both these subjects will provide the manager with insight, which will help him/her to improvise as his/her specific circumstances concerning the management of information technology demands.

Conclusion

Lief, Hoffman and Lay [41, p. 38] made the observation that South Africa seems to be behind other countries with respect to maturity of strategic information technology planning. The assumption was made in this research that managers in information services found it difficult to apply information technology models in their own environment. By integrating the knowledge on the management of change, the management of technology and the criteria for evaluating information technology management models, a user-friendly information technology management model suitable for application in academic information services was developed. In designing the model, it was discovered that the aim or goal of the model should be an integral part of the model. Integrating the goal resulted in clarity and contributed towards understanding the relationships and influences between the variables. In evaluating the model after completion, it was concluded that none of the 11 variables were unique or restricted to the education sector or to South Africa This conclusion is significant because it implies that the model can be applied as a general model for the management of information technology, irrespective of economic sector or geographic location

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New mode of course delivery for Virtual Classroom

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Internet technology has advanced very rapidly over the last few years and a new trend in educational development for learning and teaching has emerged Virtual Classroom is an online learning and teaching environment that facilitates the collaboration and integration of discussion forums, chat rooms, quiz management, lecture notes and assignment repositories, subscription services, relevant web links, e-mail distribution lists and desktop video-conferencing into a conventional lecturer-based system. This paper reviews two existing modes of course delivery in a typical virtual classroom environment, namely synchronous communication and asynchronous communication, and presents a hybrid mode of delivery named near synchronous that adds to the conventional asynchronous technology the expressiveness and rapid recall of context of a synchronous delivery. The paper discusses the Singapore-MIT Alliance (SMA) distance learning project and the current implementation of a virtual classroom in Nanyang Technological University.

Introduction

In a virtual classroom synchronous communication refers to 'real-time' electronic discussions that take place via the Internet, e g. live audio-video conferencing and chat rooms Asynchronous communication, on the other hand, is time-delayed or time-deferred computer mediated mode of delivery, e.g. electronic mail and discussion forums [1]. In the context of the Singapore-MIT Alliance (SMA) distance learning project synchronous delivery refers to live beaming video conferencing lectures between Boston and Singapore (at the National University of Singapore and Nanyang Technological University) across 12 time zones, whereas asynchronous delivery refers to a web-based courseware management and delivery system (named 'Hi-Command') developed in-house by the Massachusetts Institute of Technology (MIT).

In a typical live beaming lecture the lecturer could be communicating with a local class in the conventional classroom set-up with a remote class attending the same lesson thousands of miles away. The students at both local and remote ends, when in doubt, can interrupt the lecturer and then ask or discuss interactively with the lecturer or their fellow counterparts studying the same course at the remote end. Advanced tracking cameras, activated by Press-to-talk microphones, are used to facilitate the electronic form of raising a hand before asking a question.

Synchronous or asynchronous: how to fulfil the needs

Synchronous communication captures the essence of face-to-face interaction Interaction among the participants (lecturer and students) can be lively and the context of a discussion is always retained. This form of interaction is always found in a conventional classroom environment whereby the students have direct and immediate contact with the lecturer. This is most suitable for interactive question and answer sessions.

Asynchronous communication, however, happens at a later time and it requires the effort and time of a participant to resume the earlier context of a discussion [2]. The students can access the archived materials as and when required, repeatedly when necessary The student could also post questions in discussion forums or interact with the lecturer via e-mail after the class. At times, creative ideas are generated from these questions. This mode of interaction is ideal for students who are shy and less outspoken.

Preliminary studies by two institutions, the National University of Singapore [3] and Temasek Polytechnic [4], showed that the Virtual Classroom encourages better communication and is a good vehicle for encouraging some form of creative thinking Students, even the less outspoken ones, post questions in discussion forums whenever they are in doubt about anything. By doing so, both students and lecturers contribute and share useful information that is not raised in the class

Synchronous communication requires the participants to be present 'virtually' The involved parties need to be connected via technology for the live interaction to take place It requires expensive equipment, like a video conferencing system, and network resources like high Internet bandwidth or ISDN connection. In addition, manpower is required from the connecting parties to ensure the smooth operation of the live beaming lecture from the remote broadcasting site to the receiving classroom.

Despite the heavy investment in manpower and equipment, it is still not uncommon to experience outages in synchronous links. During a class observation of one synchronous session, the remote Internet link at NUS was broken and the lecture was interrupted while the problem was being resolved. In addition to such down times, it has been observed that the video frames transmitted via the Internet can freeze up and the audio transmitted via the Internet or ISDN can break up at times. This shows that this mode of communication is costly and its performance is always dependent on the stability of the technology in use and the expertise of technical support staff to counter outages that surface unexpectedly

Near-synchronous

A new mode of course delivery named near synchronous is proposed. As the name suggests, it is 'near' or akin to live synchronous communication, and in itself it is an enhanced version of asynchronous delivery that attempts to be expressive and context sensitive [2]. An example of near synchronous communication is the utilisation of video for Frequently Asked Questions (FAQ) and this is an added speciality on top of online lecture materials.

In these video FAQ, the lecturer uses an input device like tablet (e.g. WACOM) to annotate the presentation slide and screen capturing software (e.g. Lotus Screen Cam) to record the give and take of a discussion. For example, the lecturer could record the entire process of deriving a mathematical equation with the narration using a desktop video camera capturing the lively expression of gestures and a microphone capturing the tone, and the screen capturing software tracking the essence of the mathematical derivation The beauty of video FAQ is that this process can be stopped at any time and also reviewed repeatedly where necessary.

Learning is enhanced when the lecturer's explanation ('the teaching process') is being clearly illustrated and reviewed. This is especially useful as students can revise the materials repeatedly any time at their convenience and this also serves as a valuable source of materials for future references prior to examinations. Their learning patterns will not be restricted by rigid lecture hours in this mode of communication.

The student can also participate in a discussion by recording the question as an audio or video clip, using a desktop video camera and microphone By using screen-capturing software, the student can annotate a particular shared document and then record the inquiry as a video clip The student can then post this video clip in a discussion forum for the lecturer to reply to at a convenient date/time. Provision is also given to allow several layers of such annotations, and the original document is not affected by these annotations All the discussion threads are readily available to all students and the questions and answers will substantially benefit all as long as they logon to the system regularly and actively participate in the discussions

To facilitate fast retrieval and cataloguing of any threaded discussion, an Instructional Management System (IMS), a standard for tagging meta-information, has been proposed. The discussion threads will be tagged with information on the contributor, date, time and the media type. With the use of an IMS compliant search engine, the lecturer and student will be able to refer to any portion of the media documents easily and quickly [2]. Even if IMS is not incorporated, the archived materials can be sorted simply by contributor, topic, date and time, and this facilitates fast retrieval of any discussion thread.

Is near synchronous the way to go?

In another class observation, the teaching style of the lecturer did not encourage much question and answer interaction with the students. Expensive network resources (Internet bandwidth and ISDN) were consumed to deliver the live audio and video feed across 12 time zones between Singapore and Boston Near synchronous is a good alternative for such a problem, and the costly live synchronous time slot can be reserved for interactive tutorials or question and answer sessions. DeRienzo [5] questioned the need for 'live' connection when there is no interaction in a synchronous set-up.

Near synchronous communication is more interactive than the conventional asynchronous platform (e g. web-based discussion forum and exchange of e-mails) as it has the added dimensions of having audio, video and annotations to make the question and answer session livelier As the media rich discussion threads are archived on the Web, the students can review them repeatedly. The lecturers can also choose to reply to the students at anytime at their own convenience. The give and take of an explanation is always available when the students are doubtful about any concept As compared to reading the lecture notes by themselves and trying to recap what was being taught in a class that happened some time ago, these archived video FAQ are far more superior as they are readily available on the Web, any time, anywhere.

If the student reviews the online lecture notes and video FAQ before the synchronous lecture proper, the live sessions will be more interactive as the student will come prepared with some basic understanding of what is going to be covered in class This would encourage more questioning and, when understanding of the key concepts is being asked, the lecturer could give more in-depth content This would stimulate and enhance learning among students.

Making Virtual Classroom interactive

DeRienzo [5] highlighted that in distance learning interaction is the key factor and passive 'lecturing' deadly. DeRienzo suggested the concept of 'active learning' as an alternative to 'passive learning'. Students should become engaged participants instead of being passive recipients Lecturers should play the role of facilitators, mentors and coaches rather than that of information broadcasters. Students should be evaluated on their problem solving skills, rather than on how much material they could memorise and regurgitate. The approach that should be adopted should be objective driven and not content driven

With improvements in information technology, there is a change from lecturer-centred to student-centred approaches in the mode of teaching. With the lecturer's role becoming a facilitator of learning, our students should be persuaded that they have to participate more actively and contribute to their learning. They need to be more disciplined and have greater self-management, and they must know what to learn, how to learn, and have the ability to evaluate their own learning To do so, we need to change their mindsets, build up their confidence, encourage reflection while self-learning and develop their collaborative skills There is a need for our students to view things differently, critically and creatively [6]

Near synchronous communication is a new concept that we are exploring at the moment By making a virtual classroom more interactive through audio, video and document annotations, the students will be keen to learn more. We need to come up with challenging course content that encourages them to think 'out-of-the-box' and adopt creative thinking. As we would very much like our students to be life-long learners who would constantly upgrade themselves in this knowledge economy, we need to come up with an innovative and practical learning platform that allows them to do e-learning any time, anywhere, and most importantly, e-efficiently and e-effectively

Interactive classroom in NTU

Nanyang Technological University (NTU) is currently implementing an interactive classroom for the Singapore-MIT Alliance (SMA) distance-learning collaboration Synchronous lessons will be conducted by video conferencing across 12 time zones between NTU and MIT Internet 2 will be utilised to provide the audio and video link, with IDD and ISDN calls as contingency measures.

If outages like breakages in Internet 2 connection happens unexpectedly, an IDD call will be made immediately while we initiate ISDN connection with MIT. As ISDN calls usually takes a few minutes to be established, the fail-safe IDD call would ensure minimal interruption of the audio portion of the lecture The students would not miss much as they can still refer to the pre-printed hardcopy of the lecture notes while listening to the lecture. A video conferencing system that supports both IP and ISDN modes, named VCON, will be used in the NTU Smart Classroom. To make the classroom more interactive, an electronic form of raising hands in question and answer sessions is done via a 'press-to-talk' low profile microphone. To do so, the student needs to press and hold a button, and then speak into a microphone while talking. This mode of asking a question would activate the camera immediately and reduce the latency for the camera to pan, tilt and zoom, as in the case of a voice activated ceiling or table microphone

To further improve the quality of voice and audio reception, the students could wear headsets during class. The headset that we shall be using is comfortable to wear and has good acoustic quality. With the headset's microphone located nearer, it is more natural for the students as they do not need to speak up, i e. lean forward and project their voice into a low-profile 'press-to-talk' microphone. A network of 50 PCs will be set up, with desktop video conferencing CODEC cards installed and a digital video camera mounted on the PC monitor. The students may use it for off-class interaction (via NetMeeting) with faculty members and project collaboration with students at the remote end.

The digital video camera can be used to capture a close-up video of the student who is asking a question This student video will be projected onto the two front projection screens and also sent over to MIT simultaneously, with the audio transmitting through the headset's microphone. With this set-up, the professor at MIT would be able to see the individual student clearly, similar to one-to-one interaction in a conventional classroom environment, rather than 'seeing' a group of students at the far end video. This form of communication is more personal and effective as the professor can see the student's expression and gestures clearly. A software-based classroom management and control system (named SmartClass) will be used to disable the mouse, keyboard and blank off the computer monitor while the lecture is in progress The system also allows the faculty member to review individual student work, share it with the whole class and even facilitate students-to-students discussion.

When the lecture is conducted in NTU and beamed over to MIT, it is essential that the professor maintain eye contact 'virtually' with the students at MIT. Two 42– Plasma monitors are installed at the back of the classroom as prompters for the professor One of them will be showing the data, typically Microsoft Presentation slides, whereas the other plasma displays video at the remote end, typically far end video from MIT for student question and answer interaction.

NTU is setting up a video archival system that allows real time streaming and recording of the live lecture into MPEG-2, MPEG-1 and Real formats, and automatic uploading of digitized video files to a web server. By using this system, we need not perform any manual encoding and digitization of the audio and video streams. We approached the design of this set-up from an infrastructural point of view and we are hoping to use this video archival system so that every lecture conducted in any lecture theatre in NTU could be digitally archived and published on the Web automatically

Conclusion

Information Technology has advanced so rapidly that it is now feasible to attend a live lecture from a location that is 12 time zones away, and we are able to 're-attend' the lecture repeatedly on a web server. At this juncture, it makes sense for us to take a step back and review what we are doing right now. Interaction is the key strength of a conventional lecture-based classroom environment. Are we able to replace it with a web-based lecture repository, with archived audio and video of the lecture proper? Is near synchronous a good alternative for an interactive virtual classroom? Will our IT savvy students be lacking social skills in future, when everything can be done on the Web? How could we create a 'socially rich' environment in a virtual classroom?

Information technology, or rather knowledge technology (in the context of our knowledge-based economy), should always be driven from the pedagogical perspective, with specific focus on whether it helps to facilitate learning and teaching. Undoubtedly, IT helps. However, IT by itself is insufficient We still need good mentors (i.e. our lecturers) for the personal touch in imparting knowledge, motivating our students and moulding their characters

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